u-IS4
Letter
Original

December 2, 1986

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Dear
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:

A Distributed Processing Service (DPS), in its "purest" form, is defined as the placement of user-dedicated computers which share processing with vendor machines at either the user's or vendor's site. Expanded from user site hardware services (USHS), the method offers powerful remote computing service (RCS) software coupled to a user-site computer, usually provided by the vendor, hosting internal applications and serving as a node on the vendor's network.

Historically, DPS configurations used minicomputers. However, as computer classifications blur due to their growing capabilities, the issues and opportunities involved require broader considerations, including microcomputers and supermicros.

The enclosed report, Distributed Processing Services in the New Telecomputing Environment, examines the evolution of DPS and its place in general and specialized business applications. The study profiles DPS providers and explores the impacts of advancing technology and changing user requirements on this RCS delivery mode.

Included is a market forecast, detailed recommendations to users, and descriptions of current and potential DPS implementations.

As always, your comments and queries are welcome.

Sincerely yours,

Victor S. Wheatman
Senior Consultant

VSW:ml

Enclosure

DISTRIBUTED PROCESSING SERVICES IN THE NEW TELECOMPUTING ENVIRONMENT

OCTOBER 1986

Published by
INPUT
1943 Landings Drive
Mountain View, CA 94043
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Information Systems Program (ISP)

Distributed Processing Services in the New Telecomputing Environment

DISTRIBUTED PROCESSING SERVICES IN THE NEW TELECOMPUTING ENVIRONMENT

ABSTRACT

Distributed Processing Services (DPS) is defined as "the placement of user-dedicated computers which share processing with vendor machines at either the user's or vendor's site."

Expanded from user site hardware services (USHS), the method offers powerful remote computing service (RCS) software for execution on the vendor's computers, along with other vendor services such as communications and data bases.

This report examines the role of DPS and its place between full RCS usage and internal processing solutions. The report also examines associated issues such as linking user processors of all sizes to RCS services.

Included is an analysis of user needs, case studies, and participating vendor profiles. The study concludes with detailed recommendations.

This report contains 164 pages, including 29 exhibits.

U-IS4-295

DISTRIBUTED PROCESSING SERVICES IN THE NEW TELECOMPUTING ENVIRONMENT

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DISTRIBUTED PROCESSING SERVICES IN THE NEW TELECOMPUTING ENVIRONMENT

EXHIBITS

I INTRODUCTION

I INTRODUCTION

A. BACKGROUND

- This report, produced by INPUT's Information Services Planning (ISP) program, examines distributed data processing services (DPS). In its "purest" form, DPS is defined as the placement of user-dedicated computers which share processing with vendor machines at either the user's or vendor's site.

- Expanded from user site hardware services (USHS), the method offers powerful remote computing service (RCS) software coupled to a user site computer, usually provided by the vendor, hosting internal applications and serving as a node on the vendor's network.

- Earlier in RCS history, tape pick-up and delivery (PUD) was the primary means of transporting user data to the RCS. User data was also accepted as raw information (input forms) for keying into the system. Now, users are increasingly accessing remote processors via dedicated lines, the vendor's network, or through a value-added network (VAN) from their own processors which prepare data and, in some cases, perform preprocessing activities.

- Historically, DPS configurations have used minicomputers; therefore, this report focuses on minicomputer/RCS services where the vendor provides or supports an on-site processor as part of the service contract. However, as computer classifications blur due to their growing capabilities, the issues and

applications involved require broader considerations, including microcomputers and supermicros.

- The advent of the microcomputer has had a major impact on corporate information systems and will assume an increasingly important role.

  - This means it is imperative for user organizations to incorporate micros into their strategic planning.

  - Therefore, for this study, INPUT also takes into account increasingly powerful micros which may be used in a distributed processing service application (i.e., PC-RCS services) and which may be used for a variety of other purposes when not accessing the RCS.

  - These micros may be standalone systems, multiuser systems (MUS), or work group clusters linked in a local area network (LAN).

- Further, the role of user-owned (as opposed to vendor-supplied) computers, from mainframes to micros, which interface RCS services is considered.

- The definition of DPS assumes that the role of the user-site computer is more than terminal emulation; the equipment must minimally support not only data collection tasks, but organizing or formatting functions as well (i.e., preprocessing).

- In approaching this study, INPUT found RCS vendors caught between decreasing costs of end-user processing power and communications costs which have not dropped as much. Meanwhile users are bringing applications and development tools, previously accessed remotely, in-house.

- Regardless of user directions to gain control over processing and communications, there remain situations and conditions for which DPS is a suitable solution, as this report identifies.

- INPUT's research found DPS described as a defensive strategy, a customized approach, an alternative delivery option, and a transitional niche offering for end users weaning themselves from RCS services. All definitions are applicable with the last the most meaningful.

- A number of issues relate to the success or failure of DPS implementations: communications, user attitudes toward external services in general and specific vendors in particular, users' abilities to meet increasing demands for corporate information services (IS), and others. Accordingly, user and vendor views of several related issues are necessary in order to gain a full perspective on DPS services as a discrete delivery mode.

B. METHODOLOGY

- The research for this report incorporates several converging information streams:

  - Client interviews.

    - INPUT conducted a client poll of subscribers to both the user-oriented Information Services Program (ISP) and the vendor-oriented Market Analysis and Planning Service (MAPS) to determine areas of special interest and to learn of their experiences, problems, approaches, and needs.

  - Corporate interviews.

    - Approximately 40 structured interviews were conducted with IS and end-user department managers of large and midrange corporations in June and July 1986. The respondents were fairly

evenly distributed between current and recent RCS users and included several current or recent DPS users. The research questionnaire is presented in Appendix A.

- Vendor interviews.

  - Telephone and on-site interviews were conducted with 13 vendor personnel representing RCS vendors. Appendix B contains the vendor questionnaire.

- Product and service analysis.

  - INPUT collected and analyzed information on RCS services and reviewed secondary research to help determine strategies, vendor directions, innovative approaches, and position of DPS services within the product mix.

- Other INPUT research.

  - INPUT has examined RCS services throughout its corporate history, with several studies, published and proprietary, directly or indirectly related to the current subject. INPUT examined DPS when the first such services were introduced in the late 1970s; the current report has thus gained from this historical perspective. These studies are described in Appendix C.

C. SCOPE

- The study is organized as follows:

- Chapter II is an executive summary of the entire study, formatted to serve as a ready-to-go presentation to facilitate group discussion, complete with overheads and script.

- Chapter III is an overview of remote computing services, focusing on DPS. The chapter traces the evolution of these services, briefly discussing the effects of micro and minicomputers, and describes vendors' defensive responses to technological and market developments. The chapter also discusses DPS applications.

- Chapter IV provides more in-depth analysis of the technologies, trends, and issues impacting DPS services, discussing hardware, future processors, software requirements, and the communications elements of DPS.

- Chapter V presents the results of INPUT's user interview program, discussing attitudes and directions toward decentralization, processing power, operating system environments required, integration requirements, and other relevant aspects. It also discusses observable cycles and user concerns. The chapter concludes with market forecasts.

- Chapter VI presents several case studies, describing applications, the reasons for DPS usage, and the status of past users.

- Chapter VII profiles vendors which now offer distributed processing services and includes examples of vendors using processors other than minicomputers in tightly coupled RCS/user site hardware services.

- Chapter VIII summarizes the study, providing guidelines for user evaluation of DPS services.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- This Executive Summary is designed in a presentation format to:

  - Help the busy reader quickly review key research findings.

  - Provide a ready-to-go executive presentation, complete with script, to facilitate group communications.

- The key points of the entire report are summarized in Exhibits II-1 through II-7. On the left-hand page facing each exhibit is a script explaining its contents.

A. REMOTE COMPUTING SERVICE HISTORY

- Computer timesharing systems were developed in the 1950s to support military needs. Data communications, an essential component of remote computing, was also evolving during this period.

- Processing power became more affordable in the late 1960s and early 1970s with the introduction of minicomputers, originally designed for scientific and engineering needs and later adapted to office systems and production processing.

- With minicomputers came distributed processing, connecting multiple minis to a central host and used initially for transaction processing. Later came desktop processing with the now nearly ubiquitous microcomputer and associated software designed for end users rather than computer professionals.

- Essentially, a triad internal processing environment evolved: end-user micro-based computing, office systems, and production data processing.

- Generally, these domains developed separately, with separate staffs and different hardware, software, and service vendors for each environment. Later, users and vendors recognized that integrating the three systems would lead to greater efficiencies and other benefits. For many, however, integration would be (and still is) difficult.

- Meanwhile, RCS vendors began to experience declining growth and eroding profits as processing migrated from a service mode to internal systems. Many RCS firms recorded alarming losses and were forced to change.

EXHIBIT II-1

INPUT®

REMOTE COMPUTING SERVICE HISTORY

1950s	-	Military Timesharing and Data Communications
1960s	-	Business Remote Computing
	-	Commercial Services Introduced
1970s	-	Minis, DDP, and Micros Appear
	-	Distributed Processing Services Introduced

B. RCS VENDOR RESPONSES

- RCS vendors responded to the changing environment in several ways:

  - Some shifted their focus to selling the software which was previously accessed via timesharing. Initially this meant mainframe software, but it became software on all levels.

  - Some vendors introduced turnkey systems, bundling hardware and software to provide customers with processing similiar to that available on-line.

  - Some vendors leveraged their expertise in designing, configuring, installing, maintaining, and managing information service facilities to offer professional services beyond processing. In some instances, processing services were deemphasized or even discontinued.

  - Some vendors targeted niches which were too small for competitive hardware vendors or rival RCS firms to address, particularly when industry- or function-specific software was needed.

  - Some vendors joined others through mergers and acquisitions to build critical mass in attempts to survive.

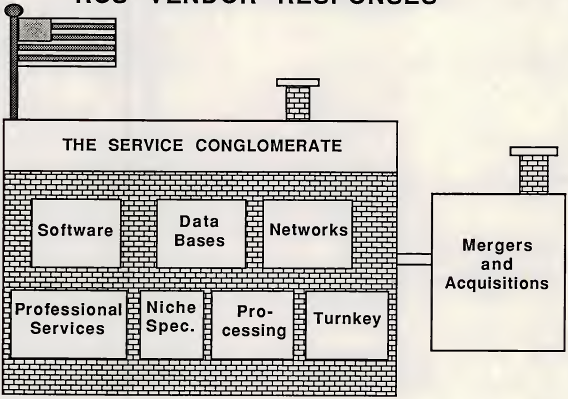
  - Others vendors repackaged their services to incorporate microcomputers or other processors into the service mix.

- The most successful vendors became "service conglomerates" offering a range of professional services, processing, communications, software, and/or hardware solutions to their customers.

EXHIBIT II-2

INPUT®

RCS VENDOR RESPONSES



C. DISTRIBUTED PROCESSING SERVICES BRIDGE OPTIONS

- One RCS response to industry change was distributed processing services (DPS).

- A distributed processing service is defined as processing via RCS computers and user-dedicated computers at the user or vendor sites.

  - When first introduced, user site hardware costs were bundled in a fixed price contract; currently, however, vendors encourage users to take title to the equipment.

  - This report focuses on minicomputer-based DPS since this was the original configuration offered. However, DPS configurations can be based on microcomputers (standalone or clustered), multiuser micro systems, or even mainframes.

- DPS provides a bridge for customers weaning themselves from RCS services and bringing applications in-house.

- Early DPS participants were ADP (Onsite), General Electric (Mark III DDP), and National CSS (now D&B Computing).

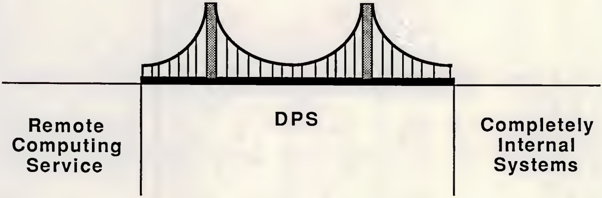
- Later entries in DPS include Control Data Corporation (Distributed Services) and Shared Medical Systems (Action).

- Key features of DPS are user-dedicated processors hosting RCS-provided applications. This processor is linked to the RCS. The link supports access to infrequently used applications, data bases, and communications services such as E-mail. It is also used for overload and peak processing, data transfers, and equipment monitoring.

EXHIBIT II-3

INPUT®

DISTRIBUTED PROCESSING SERVICES BRIDGE OPTIONS



D. DPS BENEFITS/DISADVANTAGES

- The benefits of DPS are:

  - Access to significant and specialized RCS applications, high-power processors, equipment (such as high-speed printers, plotters, or mailing equipment), and services (such as consulting, communications, and customized programming).

  - Better control over RCS processing costs due to fixed-price contracts with discounts provided on other, not included, RCS services.

  - An economical way to test new applications or equipment before committing resources to buying them.

- The disadvantages of DPS are:

  - For large companies with constant use of the same applications, in-house IS departments are more cost effective.

  - Loss of control. A user organization is at the mercy of the vendor; any equipment failures are beyond the user's control.

  - Redundancy. The company's internal systems may duplicate some supported by the DPS.

EXHIBIT II-4

INPUT®

DPS BENEFITS/DISADVANTAGES

BENEFITS	DISADVANTAGES
• Access to RCS - Applications, Equipment, Data Bases, Services	• Internal Systems May Be More Cost Effective
• Fixed Price	• Loss of Control
• Does Not Require IS Staff	• May Be Redundant

E. WHY VENDORS OFFER DPS

- Vendors offer DPS primarily to maintain a customer considering migration to an internal system, away from RCS services.

- By bridging these customer options, the user enjoys support during what may be a difficult conversion period, and the vendor/client relationship can be extended.

    - The RCS vendor first licenses applications on a timeshared basis, then provides them via DPS delivery mode, and finally makes them available on the customer's equipment.

    - Further, the RCS vendor hopes to continue to provide other services such as communications, data bases, overload processing, and professional services.

- Other equally important reasons include:

    - High profit margins. Because the client performs most of the work involved, DPS configurations require little vendor support. Understanding this becomes important in negotiating contracts with vendors.

    - The vendor's desire to participate in distributed data processing and decentralization trends. Originally, DPS was seen as supporting multiple sites of the same client.

- The most successful DPS placements are in end-user departments receiving little IS support or in settings without an extensive IS organization.

EXHIBIT II-5

INPUT®

WHY VENDORS OFFER DPS

- Fills Gap Between Full RCS Services and Wholly Internal Solutions
- High Profit Margins
- Alternative Delivery Mode
    - Expands Service Options, Product Mix
- Participation in DDP/Decentralization Trends

F. DPS MOSTLY FILLS TRANSITIONAL NEEDS

- INPUT estimates that the minicomputer-based distributed processing services currently represent a $173 million market.

- INPUT also projects that the market for DPS will be relatively flat, with a projected growth rate of a marginal 4% annually through 1991.

  - New customers will avoid or replace DPS services by taking their processing in-house.

  - Growth will mostly occur in the hospital segment, the commercial banking segments, and the general business middle market, with some installations found within larger corporations supporting specialized applications or remote locations.

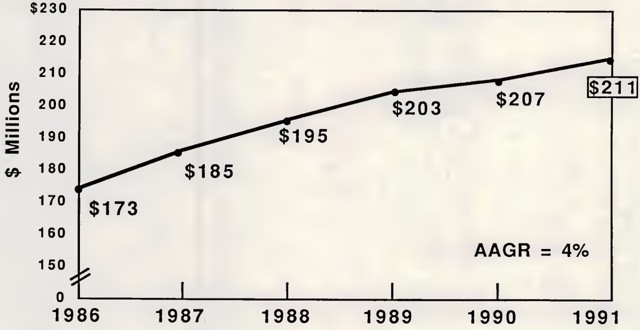
- This bearish forecast does not necessarily mean that DPS is an unsuitable service configuration for users. It does, however, underscore that DPS is primarily a bridging service which permits the vendor and client to participate jointly in the transition between full RCS-supported services and an internal IS solution.

- DPS can also support, on a long-term basis, function-specific departmental needs in non-IS environments, such as small- to medium-sized health care and financial institutions, and in marketing organizations.

EXHIBIT II-6

INPUT®

A FLAT MARKET FILLING TRANSITIONAL NEEDS



III DISTRIBUTED PROCESSING OVERVIEW

III DISTRIBUTED PROCESSING OVERVIEW

- This chapter presents a brief history of remote computing services (RCS), the technological and marketplace changes affecting the business, and discusses the role of distributed processing services in the new telecomputing environment.

A. HISTORIC DEVELOPMENT OF RCS

- Timesharing technologies were developed during the 1950s largely to serve military needs. The earliest such efforts were supported by the Defense Department's Advanced Research Projects Agency, which was also instrumental in the development of data communications networks, an essential component of RCS.

- The first commercial timesharing services were provided in 1965 for engineering and medical research applications.

- Shortly thereafter, applications-specific products and services became commercially available. During the 1970s these traditional services were augmented by numerous products. Among the most successful were planning and analysis tools.

- Remote computing services matured in the 1970s by providing timeshared access from multiple locations through proprietary networks to clients who required powerful computing or application solutions offered by these vendors.

- Leading RCS vendors in the 1980s offer on-line data bases, specific value-added applications and services, and a declining mix of planning and analysis tools.

B. MINICOMPUTERS AND DISTRIBUTED DATA PROCESSING (DDP)

- By the late 1970s, processing power was beginning to become more affordable, and minicomputers, originally targeted to scientific and engineering users, were being applied to new applications.

- The distributed data processing concept advocated distributing applications across multiple minicomputers connected to a central host in a star network. This approach was planned, implemented, and controlled by central IS staff.

  - The emphasis of original DDP implementations was distributed transaction processing with the data base remaining on the host.

  - RCS vendors tried DDP offerings with minimal success.

  - The early DDP implementions were not widely successful due to their relative complexity and relatively high cost.

- When DDP was being introduced, micros and the information center concept (originated by IBM) were not widely available, and office systems largely consisted of dedicated word processing equipment.

C. ENTER THE MICROCOMPUTER

- Finally, desktop computing became possible, and popular, with the now nearly ubiquitous microcomputer and easily used software designed for "personal" use by the noncomputer-trained end user.

- The success of micros was the corollary to the failure of minis in the office environment. Micros were, and are, inexpensive and they are usable by noncomputer-trained employees.

- Historic RCS milestones are shown on the timeline in Exhibit III-1.

D. THE TRIAD PROCESSING ENVIRONMENT

- End-user micro-based computing, office systems, and production data processing had evolved in separate areas, with separate staffs overseeing the three environments.

- For the most part, there have been different vendors supplying the hardware and software supporting these systems and services.

- IS organizations and vendors recognized the need to integrate these three information systems to faciliate information and resource sharing. Thus, "integration" became the emphasis for IS organizations and vendors.

EXHIBIT III-1

RCS MILESTONES

1980	Industry Shake-Out and Consolidation
	Distributed Processing Services
	Microcomputers
	Distributed Data Processing
1970	
	Minicomputers
	Commercial RCS
	American Airlines' SABRE
1960	Business Remote Computing
	Military Timesharing and Data Communications Development
1950	

E. STRATEGIES - THE VENDORS RESPOND

- Many traditional RCS vendors experienced declining growth and eroding profits as processing moved in-house in the early 1980s. Many recorded losses from one year to the next as new technologies and changes in orientation made their impact. In response, and to survive, RCS vendors diversified.

    - Some RCS vendors became hardware resellers, installing and maintaining micros and minis at customer sites, ideally to be used with RCS services.

    - Other vendors began marketing their mainframe software outright or adapting it for smaller processors.

        - In some cases, software was configured for the double duty of working on microcomputers and, with communications capabilities, to take advantage of an RCS mainframe's greater processing power and data bases.

        - Micro adaptations often required redesigning packages for business executives and other professional staff in an easy-to-use format.

    - Still other RCS firms leveraged their experience to expand from time-sharing into systems integration, linking client computer facilities into single networks, or by providing facilities management services for large corporations and government agencies.

    - Some RCS firms opened their once internal networks to clients, "adding value" with error detection/correction and protocol conversion, permitting customers to use RCS networks or value-added networks (VANs) for communication between customer's remote terminals and central computers, and for other data links.

- Other RCS firms have regrouped to focus on selling programming languages, data base management systems, and applications or to provide customized contract programming.

- Some RCS firms have acquired others or have been acquired, hoping to survive in a shrinking market of large companies still needing massive processing power.

- Finally, some RCS firms have adapted by adopting a variety of approaches defined as "distributed processing services." This followed the concept of distributed data processing by which a company places departmental processors in or near end-user locations as opposed to having one central facility handle all needs.

    . RCS firms taking this approach distribute computing capacity to their customers, while maintaining close links between this capacity and the central RCS facilities for certain applications.

    . Also, the links can be used for distributing software updates, to provide central data base access, to allow messaging, and to support equipment monitoring.

F. CURRENT RCS APPLICATIONS AND DELIVERY MODES

- RCS services provide many valuable, "traditional" services.

    - They make accessible expensive, sophisticated applications for users unable to afford or implement in-house solutions.

- They provide routine processing tasks (such as payroll processing), freeing internal computing resources for applications more closely aligned with corporate profitability or for those who have no computer.

- They also provide business services such as mailing or banking functions and provide access to data bases which are impractical for the customer to maintain alone.

- Some "traditional" RCS services such as program development and general business applications have moved to internal processors, including micros.

- Increasingly, and almost without exception, RCS firms are incorporating microcomputers to serve minimally as terminal emulators or as intelligent data collection tools to replace "dumb" terminals as the customer interface.

- The marriage of these processors (and even mainframes) with RCS services became the visualized path to renewed profitability for many RCS vendors.

- From the customer viewpoint, services which incorporate smaller processors with RCS services represent a greater value-added return on their hardware investment for IS functions.

  - It also represents an option. A customer is not in an either/or position: either use an RCS or install and maintain their own internal systems.

  - Rather, a hybrid delivery vehicle can be chosen which best fits the business need.

- Also, business problems call out for solutions, and many times a "one stop" solution is preferred.

- A firm which can provide a turnkey system especially designed for the customer's industry is usually at an advantage.

- The customer does not need to make individual decisions about hardware, software, communications, and support. One decision will cover it all.

- Exhibit III-2 compares internal, RCS, and DPS data processing alternatives.

G. DPS TARGETS THREE TYPES OF USERS

- Originally, DPS configurations were seen as applicable to three types of users:

  - Large consumers of a variety of outside remote computing services wanting to consolidate them on an in-house machine, usually for economic reasons.

    - Many users found RCS costs out of control. DPS, through fixed pricing, allows better cost forecasting.

    - Some users have appointed RCS coordinators to monitor expenses and ensure proper usage.

  - Users implementing distributed data processing.

    - The main thrust here is typically a redistribution of present workloads on a more economical basis and/or more in tune with managerial responsibility and accountability in an increasingly decentralized organization.

EXHIBIT III-2

COMPARING DATA PROCESSING ALTERNATIVES

	ADVANTAGES	DISADVANTAGES
Internal Data Processing Center	Known Costs Operational Control May Represent Business Opportunity (i.e., Service to Others) Designed for Unique Corporate Requirements	Large Capital Investment Long Development Requires Multiple Buying Decisions: HW, SW, Communications, Support May Require Special Site Preparation: Air Conditioning, Power, Security Requires Professional, Often Expensive Staff May Require Fulltime, Long Term Usage of Applications and Equipment to Justify Costs
Traditional Remote Computing Service	Fast Set-up, Low Start-up Costs Access to Significant Applications, Data Bases - Often Industry Specific Good Source for "One-Time" Application Pay-As-You-Go Minimal Staff Requirements Supports Distributed Requirements	Variable Costs Loss of Control Reliance on Vendor Vendor may not Provide Most Advanced HW, SW
Distributed Processing Service	Fixed, Long Term Costs Fast Start-Up, Low Start-Up Costs Adds Value to Owned HW Access to Signficant Applications, Data Bases Minimal Staff Requirements Supports Distributed Processing Requirements	Reliance on Vendor Vendor may not Provide Most Advanced HW, SW May Require Special Site Preparation

- Additionally, DDP allocates computing resources under local, departmental control for local, departmental, or personal purposes.

- New, dedicated applications fitting purposes more or less independent of the present IS environment. Examples include remote offices or special circumstances when IS cannot adequately support end users.

- Of the three target areas graphically illustrated in Exhibit III-3, users and vendors have found the new application area to be the "bull's eye." As the cases in Chapter VI sometimes illustrate, DPS solutions are often most suitable for situations where IS cannot adequately support users. This is, of course, also true for traditional RCS.

H. CURRENT DPS APPLICATIONS

- Currently, DPS configurations, such as ADP's Onsite Service and CDC's Distributed Service, support a range of financial management, planning, project management, and information management tasks.

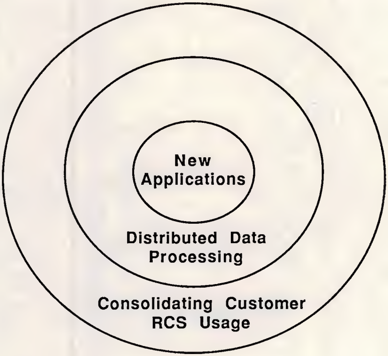
- The list of available applications is generally the same as the vendor's remotely accessed applications.

  - The difference is the delivery mode; rather than remotely accessed, the software is usually, but not always, on a vendor-owned and maintained machine located on the customer's premises.

  - This machine links to the RCS through the vendor's VAN or a leased line for access to additional applications, development tools, data base access, and other purposes (monitoring, updates, etc.).

EXHIBIT III-3

DPS USER TARGETS



I. EMERGING DPS APPLICATIONS

- There are a number of areas representing emerging applications which INPUT feels are suitable for DPS configurations.

1. ELECTRONIC DATA INTERCHANGE (EDI)

- INPUT projects an EDI average annual growth rate of approximately 100% through 1990.

a. EDI Defined

- EDI is the electronic exchange of business information between companies in a structured application.

- It is used to exchange electronic versions of standard business forms such as purchase orders, invoices, shipping bills of lading, and other documents otherwise prepared on computers, printed, and mailed.

- These exchanges can be handled by incompatible systems even though different document/data formats are used. EDI software translates the information to conform to agreed structures, routes it to the trading partner, or places it in an electronic mailbox for later retreival.

- While exchanges directly between two companies are certainly possible, complex business transactions often make managing such links difficult. For example, the auto industry buys components from approximately 35,000 small suppliers.

- Accordingly, third-party EDI services are being offered by RCS firms and value-added networks (VANs).

b. EDI Service Vendors

- Vendors currently offering EDI services are McDonnell Douglas Electronic Data Interchange Company, General Electric Information Services Company (GEISCO), Control Data Corporation, IBM's Information Network, Sterling Software (formerly Informatics General), TranSettlements, Rail Inc., and SCM Kleinschmidt. Several specialize, or at least focus, on specific industries.

c. EDI and DPS

- EDI represents a promising cost savings application for users and, in some cases, is suitable for DPS configurations.

  - Many of the available software packages work as "front-ends" to third-party EDI service.

  - Software companies such as MSA and McCormack and Dodge are reportedly adding EDI modules to their accounting and other packages.

- An RCS provided or supported minicomputer hosting internal departmental applications (accounting, shipping, inventory, etc.) with EDI functionality for document translations and communication through the vendor's network would be an attractive offering. To date such services are not available as EDI itself is an emerging area. However, forward planners can anticipate:

  - Specialized data bases (i.e., shipping rates) as a useful value-added feature.

  - An on-line data base of products offered for sale facilitating the buying and selling process.

  - At least one vendor is exploring the use of information transferred on the network to create a specialized data base for market research and other purposes. Other similiar implementations are expected.

- EDI services will be used by several departments in a corporation (purchasing, cash management, shipping, warehousing, etc.). Therefore, multiple DPS configurations are possible. Rather than develop a fully integrated system themselves, many users will seek professional services to integrate an EDI solution across departmental lines.

2. ON-LINE DATA BASES

a. Importance

- Users surveyed for INPUT's 1986 study, Network Services Directions, project the importance of commercial on-line data bases (OLDB) will increase 20% in the next two years. INPUT projects that OLDB service revenues will grow at a 24% annual rate through 1991.

- User expenditure forecasts for OLDB services by market segment are shown in Exhibit III-4.

- Among the factors contributing to this growth are the increasing recognition of the value of information and micro-based software which eases the search process.

b. Front-End Trends in OLDB

- OLDB search structures can be complicated, often requiring specialized training.

- One trend in OLDB is the development of software which serves as a front end to the data base, facilitating the search process. This is a form of distributed data processing.

EXHIBIT III-4

ON-LINE DATA BASE SERVICES USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1986-1991

SEGMENTATION	$ Millions 1986	$ Millions 1991	AAGR 1986-1991 (Percent)
Industry-Specific			
Discrete Manufacturing	$149	$368	20%
Process Manufacturing	200	408	15
Transportation	67	141	16
Utilities	28	49	12
Telecommunications	75	228	25
Distribution	235	671	23
Banking and Finance	876	1979	18
Insurance	92	175	14
Medical	149	409	22
Education	56	100	12
Services	299	605	15
Federal Government	8	19	19
State and Local Government	9	23	21
Other Industry-Specific	65	166	21
Subtotal	$2308	$5341	18%
Cross-Industry			
Securities	195	679	28
Credit	291	576	15
Text/Bibliography	98	254	21
News	191	759	32
Economic/Other	111	352	26
Subtotal	$886	$2620	24%
Grand Total	$3194	$7961	20%

c. OLDB and DPS

- Industry-specific business data bases are available through several RCS vendors. For example, ADP provides a variety of investment and economic data bases.

  - For ADP's distributed processing service called Onsite, data bases can be wholly or partially downloaded through the vendor's Autonet VAN to a dedicated Onsite processor's storage for customer manipulation.

  - This method reduces the user's on-line charges and encourages analysis without concern that "the clock is ticking" and charges are being accrued.

- Alternatives to electronic data base distribution and access are floppy disk distribution and emerging CD ROM data bases.

  - One disadvantage of these methods is the need for periodic updates.

  - A DPS configuration using local magnetic or CD ROM data bases can overcome this disadvantage by combining local and remote searching. This possibility is further described in Chapter VIII.

- Vendors often license data bases for in-house customer installation.

  - Users no longer need to rekey information into spreadsheet or graphics programs.

  - Vendors often sell analysis, graphics, or formatting software designed for use in conjunction with the data base.

- By adding value to the OLDB through these means, increased access can result since the user interface software facilitates accessing and manipulating the information. This means more utility but also more costs to the user.

J. INDUSTRY-SPECIFIC APPLICATIONS

- This section describes current and prospective distributed processing services of interest to INPUT clients.

1. BANKING AND FINANCE

a. Overview

- Financial institutions are becoming increasingly unstable, and major industry consolidation and restructuring is underway.

- Interstate banking, now a de facto situation, will probably be authorized through federal and state legislation over the next five years.

- Financial institutions are extending their service offerings with electronic banking and other activities while moving toward the goal of full relationship-based banking, with a total portfolio of financial information services for clients.

  - These include brokerage services, investment advice, money market and other nontraditional investment vehicles, and home banking.

  - A broadening of the types of financial services that now can be offered is seen for virtually all financial intermediaries, including nonbanks.

b. RCS Usage and DPS Implementations

- Personnel growth in this sector has declined from 3% annually to approximately 1% since the 1970s, while deposit growth has increased. In place of personnel, increased information services expenditures are supporting the industry's activities.

- The banking and finance sector accounts for more expenditures in information services than any other market.

- There is little doubt that the industry is continuing to automate, with over 20 billion electronic transactions in 1985, and growing to over 65 billion annually within the next decade.

- As can be expected, the banking and finance sector is a heavy user of processing services. The combination of RCS, batch, and facilities management makes up 68% of the total 1986 segment-specific information services expenditures.

- By 1991, this proportion will drop to 63% of the total, with the shift of existing applications to distributed on-site mini and microcomputers. These on-site processors offer new opportunities to sustain processing services with DPS configurations.

- INPUT estimates that 1986 user expenditures for processing services in this segment totaled $4 billion and will grow at a 15% annual average growth rate through 1991.

c. <u>DPS in Banking and Finance</u>

- Small and midsized banking institutions are the most suitable users of DPS services.

  - The cost savings of DPS compared to full RCS usage for all needs and the difficulty of managing a complete internal information services department suggest a configuation capable of handling both internal systems and processing, with RCS links for back-up, overload, and communications intensive activities.

- The communications link may support a variety of functions such as electronic transactions, messaging, financial market data base access, and trading services.

- Services to this segment may be provided by RCS vendors or by the data processing divisions of larger institutions, as in correspondent banking services. In fact, several independent RCS firms have been formed from previously internal bank divisions.

2. MEDICAL INDUSTRY

a. Overview

- Hospitals are under pressure to reduce costs through diagnostic-related groups (DRGs) and lower physical plant financing. Patients, insurers, and large employers all desire lower health care costs. As the average age of the population increases, the importance of health care and its cost increases.

- DRG-based reimbursements require current information on patient treatment and related costs and, thus, require automated systems.

- Hospitals can no longer function with separate systems for their various departments. Today, the same information must often be reentered, resulting in reduced efficiencies. This means integrated systems are required.

- Communications, both internally and externally, with insurers, suppliers, and other health care providers, has assumed new importance in the effort to control costs, improve services, and remain competitive.

b. Market Segmentation

- The medical market has several submarkets, each with unique characteristics and needs. These submarkets are grouped as follows:

- Hospitals, health maintenance organizations, and preferred provider organizations.

- Physicians, dentists, and other practitioners.

- Other medical organizations such as institutions for the mentally impaired, nursing homes, blood banks, pharmacies, and substance abuse treatment facilities.

c. Market Characteristics

- Health care's share of the Gross National Product (GNP) increased from 8.5% to 10.5% between 1972 and 1984. Between 1983 and 1984 health care expenditures rose over 8%, and they were expected to rise 10% in 1986.

- Information systems are one method of controlling these increasing costs.

d. RCS Usage

- Large medical institutions will have internal data processing based on mainframes or departmental (often turnkey) systems.

- INPUT estimates that over half of all small- and medium-sized hospitals use remote computing services.

  - Small- and medium-sized hospitals not using RCS either use manual systems, have internal processing facilities, or use the services of larger hospitals, similiar to the way large banks provide correspondent services.

  - Medical institutions use remote computing services for approximately 70% of their transactions, with interactive RCS applications accounting for 85% of user expenditures.

- The most significant factor in the projected growing use of processing services is the difficulty hospitals have in staffing complete information systems departments.

- However, as users become more computer literate, they will increasingly turn to in-house systems. Vendors have, therefore, developed in-house systems that link to their hosts (i.e., DPS).

- INPUT projects user expenditures for processing services in the hospital segment alone to be growing at an average annual growth rate of 16% from 1986 through 1991.

  - INPUT projects medical application processing services between 1986 and 1991 will grow faster than the overall processing services market, with the physicians segment growing the most rapidly but with hospitals accounting for the major portion of user expenditures.

e. Distributed Processing Services in the Medical Industry

- Users in the medical market are moving toward integrated, on-line processing services which tie together the information needs of various departments in subsystems.

  - Integrated products are available from vendors who combine turnkey or software modules with RCS services for complex processing requirements.

  - Examples are McDonnell Douglas Health Systems Company and Shared Medical, both with distributed service configurations.

f. Directions

- Hospitals are integrating their systems to cope with the informational needs of regulatory agencies and with the competitive environment.

- Hospitals need systems that can track the cost of actually delivering services, rather than simplify the cost of the services themselves. Technology supporting this requirement must integrate both clinical and fiscal systems.

- Links to insurers and suppliers are in place and usage is growing. For example:

  - General Electric's network supports an EDI system sponsored by an insurer's organization to exchange claim information between insurers and hospitals.

  - American Hospital Supply ties its computers to a hospital's inventory management system for automated ordering.

- Because of the information, regulatory, and communications requirements of the health care industry, and the problems of staffing and maintaining IS departments, users in this segment should consider DPS-type configurations linking and integrating internal and remote processing services.

3. TELECOMMUNICATIONS

a. Overview

- Divestiture, deregulation, and techological advances in telecommunications have combined to create both chaos and opportunity in this segment.

  - Technology advances and increasing network traffic have led telephone companies to upgrade their equipment, requiring specialized project management applications.

- The complexities of the new telecommunications environment include new reporting relationships requiring increased and more detailed billing records, often shared among entities for income distribution.

- Deregulation has led to opportunistic enterprises which often approach business with financial and marketing concerns overriding a user's information processing concerns, thus creating needs for remote computing services.

b. RCS Usage

- McDonnell Douglas and Comshare provide on-line telephone planning and management applications.

- Large telephone companies handle their bill processing internally, although in some cases processing is done by other carriers. An example of this is the long-distance bill processing service provided by GTE for AT&T.

- Companies providing processing services include those jointly owned by telephone operating groups such as Allied Data and TDS Computer Services, specialist firms such as Auxton Computer Enterprises and Cellular Business Systems, Inc. (recently purchased by Cincinnati Bell Information Systems), and small, regional firms such Computoservice, Computel, and Universal Data Processing.

- INPUT estimates that user expenditures for telecommunications processing services will grow at a 22% annual average growth rate through 1991.

- Small telephone companies are installing their own systems and many will collect billing data on micros while using RCS processing for toll rating, bill printing, and other needs.

c. Distributed Processing Services in Telecommunications

- Because of frequent tariff changes and the need for intercompany and agency reporting, links to RCS vendors able to maintain relevant data bases and able to provide electronic information transfers are important to telecommunications users.

- Examples exist of service configurations resembling DPS, although most use micro systems for data collection, with the data transmitted to the billing service on a scheduled basis for final processing.

- Exhibit III-5 summarizes the prospects for DPS and the reasons for using the delivery mode in these three segments.

- The next chapter focuses on technology trends impacting RCS usage in general and DPS configurations specifically.

EXHIBIT III-5

INDUSTRY-SPECIFIC DPS

INDUSTRY	PROSPECTS	REASONS
Banking and Finance	Small/Medium Institititions	Broadening Services Increased Competition Lack of IS Personnel
Medical	Small/Medium Hospitals Group Practices	Cost Reduction Pressures Limited IS Staffing Clinical and Admin. Integration Needs Data Base Needs EDI Link Needs
Telecommun-ications	Independent Telephone Cos. Start-Ups Rapid Growth Situations	Current Tariff Data Base Needs Complex Revenue Sharing Relationships Often Focused on Marketing and Admin., Not IS Needs

IV TECHNOLOGY, TRENDS, AND ISSUES IMPACTING DPS

IV TECHNOLOGY, TRENDS, AND ISSUES IMPACTING DPS

- This chapter examines hardware, software, and communications elements which are having an impact on RCS and distributed processing services use. Some of the trends identified such as less expensive, more powerful, processors are alternatives to a DPS solution, while others such as advanced processors (which will remain costly) may offer reasons for using an RCS.

A. VENDOR APPROACHES TO TECHNOLOGY

- All vendors interviewed by INPUT rate their approach to new technologies as between very conservative and leading edge. This approach takes several forms:

  - Some have a policy of maintaining capacity beyond current customer needs.

  - Others wait for new technologies to be proven before implementing changes.

  - One company said its goal is to fit into the timeframe of its customers, keeping pace with their needs.

- The approach to technology can be a vendor marketing statement.

- Conservative approaches indicate a match to the current environment, while more advanced approaches anticipate needs.

- Vendors, therefore, seek to balance the risks of implementing new technologies with attempts to attain market differentiation, while providing customers with more capabilities than they wish to implement internally at the present time.

B. TECHNOLOGY ALTERNATIVES

- Technological developments which both compete with traditional RCS usage and provide reasons for using them can be found in hardware, software, and communications.

1. HARDWARE

a. Microcomputers

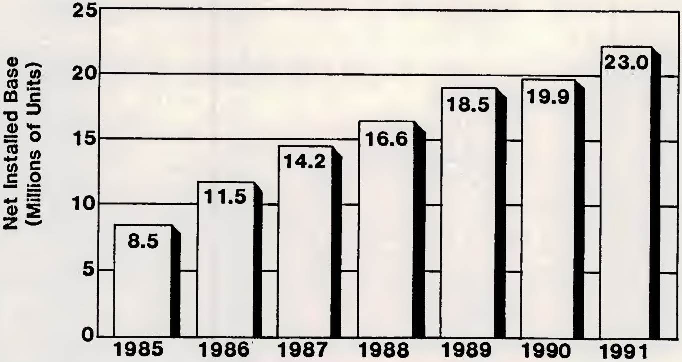
- Users should understand that microcomputers have come to represent a major challenge for RCS vendors. From a nearly zero base approximately eight years ago, U.S. business-oriented micros have mushroomed to over 8.5 million installations. As Exhibit IV-1 shows, INPUT projects that by 1991 approximately 23 million units will have been sold, and it is likely the micro population will exceed that of terminals.

- INPUT believes that vendors who fail to develop strategies using micros as a service delivery vehicle will face severe market consequences.

- Micros do have a place in remote computing.

EXHIBIT IV-1

NET INSTALLED BASE OF MICROCOMPUTERS*
IN THE U.S. BUSINESS MARKET, 1985-1991



*U.S. sales of microcomputers selling for less than $15,000 that are used for business.

- Millions of new micro users and their corporations have accepted these productive, cost-effective tools.

- Many users recognize that some critical computing and data base needs are still beyond the capabilities of micros.

• The installation rate for microcomputers represents a phenomenon surpassing many of the dynamics that took place in mainframe and minicomputer development.

  - Prices have been falling almost daily to the point where an IBM "clone" can be purchased for approximately $500--comparable to terminal costs. As a result, access has expanded quickly to literally millions of large and small business users.

  - Technological capability has increased almost geometrically with faster processors, larger storage capacity, and quicker communications capabilities.

• Creative RCS vendors are leveraging their unique strengths to incorporate micros in the RCS service mix. Examples are provided in the vendor profiles in Chapter VII.

b. Vendor Responses to Microcomputers

i. Defensive Strategies

• Several types of actions have been taken by RCS vendors to resist business losses to microcomputers.

  - Vendors have improved the utility and marketability of present services with new features or repackaged services to make them more attractive to customers considering an internal micro solution.

- Vendors have implemented new pricing schemes including fixed bulk resource pricing, transaction pricing, unbundling, and other methods to increase the price attractiveness of RCS in the face of competition from in-house mainframe, mini, and micro implementations.

- Vendors have retrained and restructured their sales staffs to sell in the new environment and to provide services directly meeting users' needs.

ii. Offensive Strategies

- A variety of products, markets, and applications are being targeted by RCS vendors for PC/RCS offerings.

  - Many of these offerings include hardware.

  - The trend is toward downloaded rather than RCS-resident software.

  - In virtually all strategies, the micro performs a major part of the processing. Micro-based software able to provide file and format conversion for mainframe software is available to allow programs and data to be extracted and further manipulated on the micro.

  - A key feature, and one growing in importance, is mainframe data base access.

  - PC/RCS services often support communications between user company sites through electronic mail services and by providing access to remote data bases or applications.

- Indications are that turnkey PC/RCS services, with the vendor optionally providing the hardware, is the dominant trend. Customers can, of course, use their own micros, and many have chosen to do so.

- Nevertheless, this direction shows that most vendors want to be full spectrum providers as opposed to simply supplying traditional processing, software, and applications expertise.

- By providing hardware, service is implicitly expanded. INPUT's survey found users are expecting systems integration, maintenance, and configuration support from vendors. These factors are discussed in Chapter V.

c. Multiuser Micro Systems

- INPUT examined multiuser micro systems (MUS) in a 1985 report and discovered a trend away from standalone micros and toward integrated office systems.

- There is confusion about what settings are most appropriate for MUS solutions and why these systems are more desirable than local area network (LAN) linked micros or minis supporting multiple terminals.

- The advantages include the cost effectiveness of sharing computing power and the work group efficiencies of sharing data and applications which are often industry- or function-specific.

- MUS' can be linked together through LANS; many support common communications protocols for batch file submission to mainframes, external networks, and RCS connections.

d. Vendor Views Toward Micros

- Despite advances in microcomputers of various forms, RCS vendors interviewed by INPUT rightly feel that micro processing and storage capabilities do not approach the abilities of larger, RCS-based processors.

- The trend toward micros is acknowledged with software and service offerings to access departmental minicomputers, mainframes, or RCS processors, performing unique, "personal" applications incorporating centrally, departmentally, or remotely stored data.

- In many cases, however, micros are transformed into "dumb" terminals, while in others, only relatively simple file transfers are supported.

- The integration of micros to perform coprocessing functions is only just beginning.

- Micros are still seen as limited. Corporate/departmental requirements still require larger processors such as minicomputers.

e. Minicomputers

- Sophisticated minicomputer-oriented software is available for systems with full networking ability. These machines are offering most of the horsepower and software requirements that many RCS users seek from a remote computing service, but at a fraction of the cost.

- Links between proprietary minicomputer operating systems and de facto standards such as SNA are available as vendors expand the value of their machines and recognize the importance of linking in multivendor environments.

- Minis and small business systems (minis bundled with software and peripherals) allow users to do most, if not all, of their processing internally while being able to link to a more powerful remote facility for long-term storage, high-speed printing, memory intensive processing, or specialized applications on a pay as you go basis.

- Minicomputers are most closely identified with distributed processing and are usually the user site hardware in DPS offerings.

f. Mainframes

- Definitions have blurred. What was once the capability of a mainframe computer can now be housed in a desktop unit. The power and cost per MIPS (million instructions processed per second) of mainframes have improved, and will continue to do so, making internal data processing solutions more affordable.

g. Supercomputers

i. Overview

- Supercomputers were formerly used almost exclusively in price insensitive U.S. government-funded research; however, there is increasing interest in commercial applications.

- Control Data Corporation (using CDC Cyber machines) and Boeing Computer Services (using Cybers and Crays) provide commercial access to supercomputers, primarily by scientific researchers, statisticians, and engineers.

- Four supercomputing facilities are operating with support from the National Science Foundation in the academic community. These nonprofit facilities award researchers time on Cray supercomputers at no charge based on the merits of a work proposal.

ii. Applications

- Supercomputers offer advantages in research and development of complex systems.

- Currently, most applications are for scientific and engineering projects such as weather forecasting, environmental analysis, seismic data analysis, simulations and modeling in aerodynamics, nuclear research, and manufacturing. For example, companies in the energy field require advanced systems to perform three-dimensional modeling and analysis based on a large number of data points.

- Emerging applications include genetic engineering, pharmaceutical and chemical processing, image processing (map enhancement, medical imaging, and film animation), electronic circuit design, and econometric modeling.

iii. <u>Needs for Commercial DPS/Supercomputer RCS Offerings</u>

- Increasing numbers of university graduates are becoming familiar with supercomputing techniques and with UNIX, which is becoming more important in this area. This suggests future demand and expectations for access to advanced processors.

- The supercomputer market is being stimulated by new demands and prospective competition from Japanese manufacturers. This has led to several research joint ventures, and new companies are producing machines with supercomputer capabilities in smaller, more affordable packages ("superminicomputers").

    - Familiarity with superminis is creating more sophisticated users and creating demand for higher power processors.

    - These machines may be used as distributed processing service user site hardware in future offerings.

- Users are testing the waters of advanced processing, but most are unwilling, or unable, to commit to expensive equipment, especially since superminis are a relatively recent, and to some, unproven technology.

- A probable user of timeshared supercomputing would be a company which recognizes the value of advanced processors for more accurate results which it can turn to a competitive advantage. An example is an insurance company seeking to improve its risk forecasts and thus lower policy prices.

iv. Issues

- Vendors are considering "Super-DPS" offerings but are facing several issues which may delay such services for users requiring them:

  - Users interviewed by INPUT were less than enthusiastic about current or prospective supercomputer RCS services.

  - Supercomputers are considered useful primarily for "number-crunching" and therefore appeal to scientific- and engineering-oriented users. However, development of transaction and data base machines is underway.

  - Supercomputers are designed for batch operations. However, interactive operating systems are being developed, with research seeking to distribute tasks between the host supercomputer and other processors. The microcomputer is seen as the standard terminal to supercomputers, able to perform some tasks before accessing the host.

  - Supercomputers are not "user-friendly" since they are designed for computer professionals. However, superminis, which could serve as frontends to larger processors, are addressing what is a software barrier to wider supercomputer usage.

  - Conversions of existing applications to supercomputers may be difficult. However, by implementing new applications this problem can be obviated. Further, as the use of UNIX increases in supercomputing, conversions will be eased.

- The previously mentioned "superminis" are competitive with RCS services. However, users may encourage custom solutions to supplement in-house superminis with RCS services, albeit at premium prices.

- Supercomputers will continue to be needed to support high-level engineering and scientific research, including activities related to the proposed Strategic Defense Initiative (SDI) program, popularly called "Star Wars." However, classified research cannot be done in a timesharing environment.

- Some vendors interviewed by INPUT feel there will be too few prospective supercomputer users to suggest expanding RCS access to these powerful machines.

  - Perhaps this illustrates a lack of imagination.

  - If the pattern of needs quickly filling available capacity continues, supercomputers could lead to new and expanded applications in artificial intelligence, space science, and other fields. One possibility forecast by futurists is a system capable of creating new movies starring the images of long-gone Hollywood stars in a marriage of image processing and computer graphics.

- Innovative applications will be found, assuming vendors have the wisdom to give creative designers a free rein to use their imaginations and assuming research and development budgets are large enough to support such "imagineering."

- Exhibit IV-2 summarizes INPUT's findings on supercomputers and DPS.

EXHIBIT IV-2

SUPERCOMPUTING AND DPS

- Currently CDC and Boeing Provide "Super" Service
- Academic Research Facilities Available
- Current Applications: Scientific and Engineering "Number Crunching"
    - Seismic Data Analysis
    - Simulations
    - Weather Forecasting
- Emerging Applications:
    - Genetic, Pharmaceutical Research
    - CAE/CAD
    - Medical Imaging
    - Computer Animation
    - Econometric Modeling
- Future Applications:
    - Business Forecasting
    - Artificial Intelligence
    - ? ? ? ? ? ? ? ? ? ? ? ?

h. Optical Computers

- Components of the optical computer are currently under development by cooperatives (representing the leading electronics manufacturers), universities, and government agencies in the U.S. and overseas.

- Optical computers will process information encoded in light beams several thousand times faster than today's electronic computers.

- Bell Labs expects to have a prototype within the year and a full-scale model within five years.

- While there are technical obstacles, most observers feel that full optical computers will be produced by the mid-1990s.

- Like supercomputers, optical computers represent capacity and capabilities awaiting new applications, such as those suggested above for supercomputers.

  - As they will undoubtedly be costly, timesharing will be the only way experimenters and developers can gain access.

  - Because of their capabilities, preprocessed information passed through links from other processors (even the "super" variety) will be of major importance, potentially representing new distributed processing service configurations.

i. Optical Disk Storage

- Optical disk storage systems using 12-inch "platters" are being used for maintaining massive archival files in digital and image formats.

- Smaller format CD ROM systems for micros and minis are emerging with the mixed media capabilities of the hardware (data, text, image, voice, video) yet to be exploited.

- CD ROM technologies will eventually have an impact on remote computing services such as Computer Output Microfilm (COM) and on-line data bases. There are prospective new DPS possibilities, as described in Chapter VIII.

- INPUT is producing a series of studies on the impact of CD ROM on information services.

2. SOFTWARE

- Microcomputer software availability and ease of use is increasing rapidly, with natural language interfaces, icons/mouse implementations, touch screens, voice command, windows, and multitasking representing improved man/machine interfaces.

- Unique software solutions must be written by users or created by vendors for licensing or occasional usage via RCS or DPS offerings. Typically, function-specific software is costly. Users must evaluate expected usage against costs to determine the economies of building, buying, or renting via an RCS delivery option.

3. COMMUNICATIONS

a. Wide Area Networks

- An increasingly competitive environment and technological advancement has presented users with an extremely rich range of choices.

- These options include traditional leased line configurations available from multiple vendors, virtual private/software defined networks, value-added networks, satellite networks, microwave links, fiber optics, and residual frequencies associated with FM radio and television signals.

- INPUT's study, Network Services Direction, examines these choices in-depth. The general finding is that multiple approaches will be found in any large corporation, and that the specific approach to a communications problem should fit the application on a cost-effective and technology-effective basis.

- Long-distance voice and data costs are dropping while local transmission costs are rising. However, users can mitigate local costs through various bypass options.

- Wide area communications issues in DPS revolve around the means of connecting the on-site system and the vendor's central site. Most DPS configurations link user site hardware with the RCS through a leased line, either directly to the RCS computing center or to a VAN.

- INPUT has recommended, and is now observing, increasing internetworking of VANs, whereby users of one carrier can access services or customers of another without maintaining additional accounts or equipment settings.

- Communications assumes an additional role in the links between various applications and processors. It is beyond the scope of this report to describe this role in detail; however, certain developments are highlighted below.

b. Local Area Networks (LANs)

- Many users still view LANs as experimental, but LAN vendors are slowly overcoming user resistance due to a lack of standards, high per-connection costs, and software concerns.

- Prospective RCS linkages to LANs resemble micro/mainframe links with the added complexities of contention, multiple access, data synchronization, and authorization levels.

- In the network services arena, one satellite network vendor (Vitalink) has targeted LAN linkages and is working with Digital Equipment Corporation to link its LAN installations in multiple user sites.

c. Micro/Mainframe (MM)

- Micro-mainframe links (internal) are very important to users. A 1986 INPUT survey of 99 companies found users estimating MM importance increasing by an average of 60% over the next two years, a finding consistent with earlier research.

- Hardware and software products supporting MM abound, but INPUT has found that these products do not yet fully meet user needs for advanced "intelligent" links supporting transparent access regardless of differing command and data structures. Development work continues, however, and meanwhile, users are finding benefits in existing products.

- Distributed processing services, when incorporating micros, are a form of micro-mainframe links which compete on some levels with internal solutions but on other levels may have advantages--particularly when large data bases or heavy processing loads are involved.

d. SNA Enhancements

- Any consideration of linkages between dissimiliar processors needs to consider the communications directions of IBM with its continuing enhancement of systems network architecture (SNA).

- IBM is targeting communications generally as an area needing development, particularly to permit linkages between their disparate equipment architectures.

- SNA enhancements center on Advanced Peer-to-Peer Communications (APPC) which will permit dissimilar processors and their applications to interact, often directly, without going through a host mainframe.

- These enhancements will have a negative impact on DPS services by facilitating user equipment and application integration, obviating needs for RCS professional integration services or integration through the routines which overcome equipment and software differences such as protocol, speed, and other conversions.

- SNA enhancements may also enable users to more closely link IBM's newly enhanced minicomputers with IBM-based remote computing services in a DPS configuration.

- While this chapter has reviewed technology trends overall, the primary impact on RCS and DPS is caused by users taking applications formerly accessed in a timeshared or distributed service mode in-house to their own processors.

- This movement is a function of the lowering costs of computing, changes from centralized to decentralized internal processing, the growing recognition of the value of information, and user needs.

- The next chapter looks at RCS overall, and DPS in particular, with the results of INPUT's user survey reported to provide a benchmark for the reader's own concerns and directions.

V USER PERSPECTIVES ON THE RCS/DPS MARKETPLACE

V USER PERSPECTIVES ON THE RCS/DPS MARKETPLACE

A. USER VIEWS AND NEEDS

- This chapter examines user attitudes and requirements relative to an RCS/DPS service, based on INPUT's quantitative and qualitative analysis of the user survey results and a review of the RCS marketplace.

1. WHY USE DISTRIBUTED PROCESSING SERVICES?

- Users were asked why a DPS would be a good option for their processing needs. Among the reasons given were:

  - "The applications and data bases available."

  - "We don't need professional IS staff or to buy expensive equipment."

  - "Internal applications development is more costly."

  - "We don't want to trust our data processing to one or two programmers. We feel more secure with an outside firm."

  - "It's a way to try applications before spending money to buy them."

- Other reasons for using DPS include cost control due to fixed-price contracts and low start-up costs, access to other RCS services such as consulting and integration expertise, and access to special equipment such as high-speed line printers, plotters, sorters, and mailing systems.

- Many of these reasons apply to RCS usage generally and not the DPS delivery mode specifically.

    - In a 1984 INPUT survey, 70% of all respondents said they first began using an RCS in order to save time, noting that it generally takes two to three years to build a large internal IS system.

    - Forty percent of the respondents cited "ease" as the reason they signed with an RCS, and only 22% identified cost as a factor. (Multiple answers account for the total exceeding 100%.)

2. DISADVANTAGES OF DISTRIBUTED PROCESSING SERVICES

- Users cited cost factors as a disadvantage, many saying that internal solutions are more cost effective. This is certainly true for large installations where there is regular use of the same applications.

- Other users indicated that using a DPS would mean losing control, that if the RCS vendor experienced equipment problems, the user would suffer. This response ignores that equipment problems can also occur internally with the user responsible ("in control").

- Concerns were also voiced that a DPS could be redundant with internal systems and that with long-term contracts, an RCS may not provide access to the most advanced hardware and software. While DPS contracts usually include provisions for upgrades, vendors interviewed by INPUT disputed this fear, saying they would lose competitive advantage if they did not have the most advanced (but proven) equipment or the latest software upgrades.

3. CENTRALIZED VERSUS DECENTRALIZED

- INPUT has tracked user directions toward decentralized information processing over time. For the current survey, users were asked to rate their directions for comparison to historic findings.

- Exhibit V-1 shows how users perceive their status currently and how they believe it will be in the future.

- Exhibit V-2 shows the results of a 1985 research program which asked users to describe how micro-mainframe links will likely impact their decentralization directions.

- Although the intent of the two survey questions was different, the graphs show similiar results with the trend toward decentralization continuing.

- Decentralization means that processing power is placed closer to the source of information creation.

    - In large companies, both centralized and decentralized environments will coexist.

    - However, centralized processors will become more equal to distributed nodes, oriented toward the consolidation of departmental data for corporate-wide reports, administration, and management.

- Exhibit V-3 shows that by 1991 INPUT projects departmental systems, defined as micro-mainframe, minicomputers, supermicros (multiuser systems), and micro-based LAN clusters will account for nearly one-half of all business-based computing capacity. Note that capacity grows threefold between 1988 and 1991.

EXHIBIT V-1

THE TREND TOWARD DECENTRALIZATION

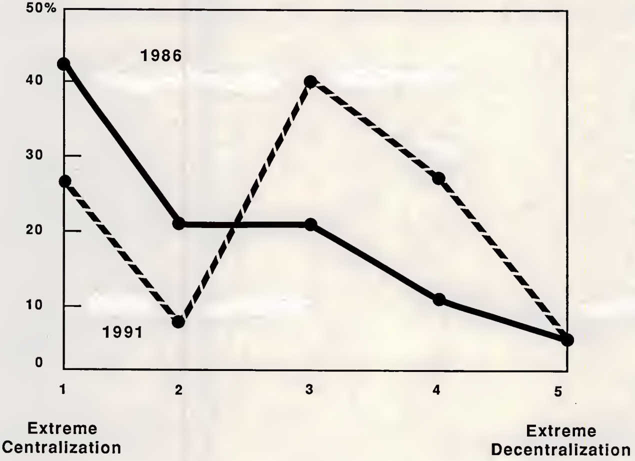


EXHIBIT V-2

MICRO-MAINFRAME IMPACTS ON DECENTRALIZATION

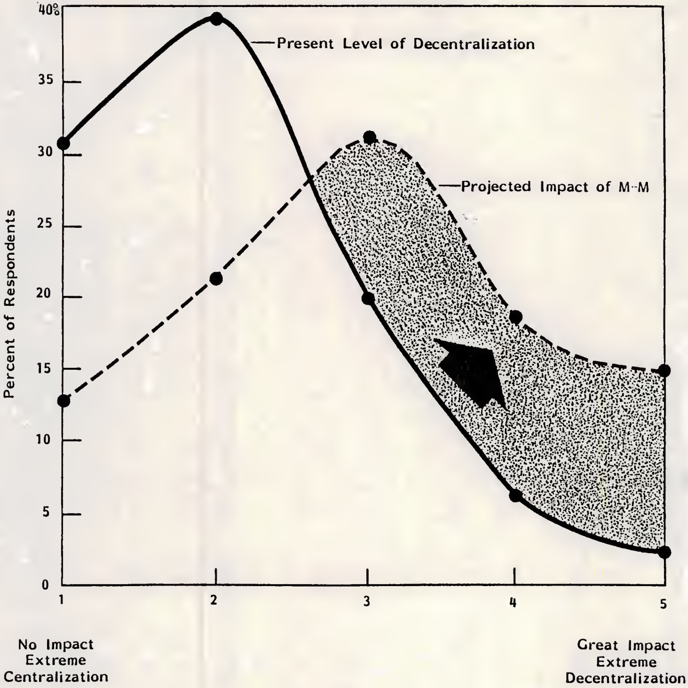


EXHIBIT V-3

DEPARTMENTAL SYSTEMS WILL EXPAND THEIR MARKET SHARE

TYPE	COMPUTING CAPACITY INDEX 1986	1991	AAGR
Remote Mainframes Dumb Terminals	.25	.60	19%
Micro Mainframe / Dept. Mini or Supermicro / PC-Based LAN	.25	1.50	43%
Standalone Micro	.50	.90	12%
MIPS Index	1.00	3.00	25%

(Shaded) = Dept. Systems

- This trend toward decentralization is important for DPS configurations as it implies more departmental processors which can serve as nodes tied to the RCS. It also often means more decision makers and the potential loss of IS control and coordination of a corporation's information services.

4. APPLICATIONS REQUIRED

- Users were asked to rate the importance of various RCS available applications and delivery modes both now and in two years.

- As Exhibit V-4 shows, high-volume transaction systems such as payroll services are currently rated highly and will remain important. Electronic data interchange will increase in importance, while general "raw" timesharing will become increasingly less important over the next two years.

5. PROCESSING POWER REQUIRED

- Users were asked if they could foresee any circumstances where they required more processing power than now internally available for which they would seek an RCS vendor. Sixty percent answered yes, some indicating it would be unusual, others doubting the RCS vendor could meet their needs.

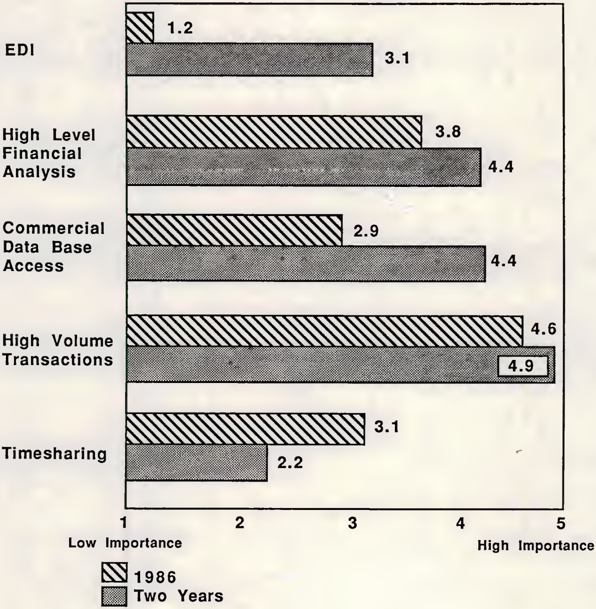
- Users were then asked if they could see a need for a supercomputer timesharing service. Users were generally less than enthusiastic about their needs for this type of service, with 30% allowing that if reasonably priced, and if the service did the job, they would be interested. Supercomputer timesharing services are discussed in Chapter IV.

6. SERVICE/SUPPORT AND USE OF CONSULTANTS

- Users were asked if they expected their RCS vendor to assist in integrating their own hardware and/or software with any RCS services.

EXHIBIT V-4

RCS USERS: APPLICATION/DELIVERY MODE IMPORTANCE



MSP4 S

- Exhibit V-5 shows the results which underscore the importance of using RCS vendors providing professional services to their customers.

- Users were also asked to rate the likelihood that they would use external, independent consultants, RCS consulting services, or their own internal staff to assist them in planning their processing needs.

- The majority indicated a high degree of self-sufficiency, as Exhibit V-6 shows, and this was particularly true of large companies.

- Users indicated that an RCS vendor should not be used to assist in planning primarily because of a vested interest in recommending the RCS' offerings. However, users did indicate that after a vendor was chosen, vendor consultant services would be accepted.

7. BUNDLED VERSUS UNBUNDLED

- DPS contracts are assembled "cafeteria-style." Each contract is unique to the customer's requirements.

- Users were nearly evenly split between those preferring a bundled contract, including all required elements, and those desiring unbundled services.

- Those requiring bundled contracts gave as reasons:

  - Ease. "We don't have the internal expertise nor the time to put the pieces together."

  - Fewer problems. "If everything is included in the contract, we won't have vendor fingerpointing in case of a service disruption."

- Those preferring unbundled contracts gave as reasons:

EXHIBIT V-5

RCS USERS' INTEGRATION EXPECTATIONS

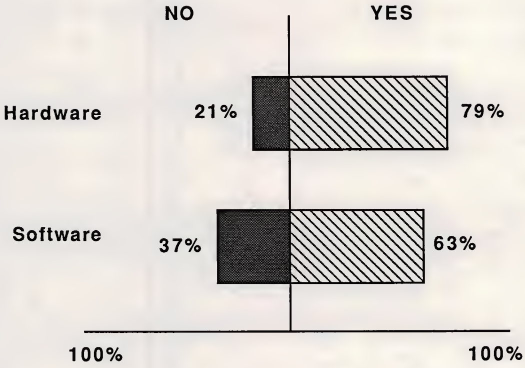
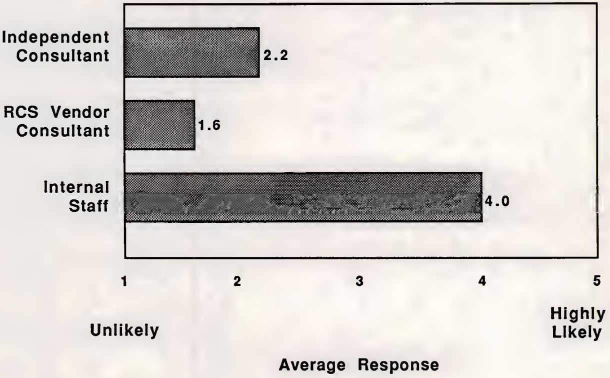


EXHIBIT V-6

RCS USERS' USE OF CONSULTANTS



- Cost control. "Every aspect should be examined since we may be able to provide some of the pieces ourselves."

- Options. "There are more alternatives with an unbundled contract, and we can substitute pieces. Besides, we like to piece the systems together ourselves to get familiar with them and to optimize the system to our requirements."

8. CYCLES/TIMING

- DPS configurations are suitable solutions for companies with transient needs which will eventually upgrade their internal systems but, for various reasons, require an interim approach.

  - The need may be for overload processing or to support a special application, perhaps in a remote location.

  - The DPS approach may be dictated by cost constraints, the inability of IS to support a department, or planning delays caused by rapid company growth.

- Chapter VI contains a case study where transient needs in a Bell Operating Company were best addressed by a DPS offering.

B. USER CONCERNS

1. VENDOR VIABILITY A KEY CONCERN

- It is interesting to note that users rated vendor viability as the most important concern when evaluating an RCS vendor. Well-publicized accounts of vendor financial difficulties and the deemphasis placed on remote processing

by some vendors is making users more wary of signing with vendors who may not remain in business.

2. NETWORK AVAILABILITY

- Users indicated the availability of a network was an important factor in evaluating RCS vendors, suggesting that vendors with a widely distributed VAN are more desirable than others.

3. SECURITY

- Security is usually rated as the primary user concern, but in this case, falls slightly lower on the scale. One user strongly opposed linking his corporate computers with the outside world, seeing this as risking an electronic security breach.

- DPS services are usually designed for multiuser environments, requiring various security measures.

  - Typically, administrative programs permit users to restrict access to the system by division, department, or employee. Time of day restrictions may also be programmed.

  - Information requests from unauthorized parties are not acknowledged, but the data is made available to the operations manager for follow-up action.

  - Storage techniques distribute file information making it difficult to assemble information without authorization.

  - The communications link in a DPS/RCS configuration can be disabled temporarily when clients are running highly sensitive applications, eliminating any chance of unauthorized access during critical periods.

- Many RCS vendors commission security audits covering physical as well as data security. These audits are available for customer review.

4. IBM COMPATIBILITY

- Not surprisingly, IBM compatibility is also highly rated. This compatibility eases integration of dedicated processors and remote services with corporate host mainframes and internal applications in IBM shops and also makes internal migration easier.

5. VENDOR'S INDUSTRY KNOWLEDGE

- While rated above midpoint on the scale, users tended to downplay the importance of a vendor's familiarity with a specific segment's practices, procedures, and problems. Nevertheless, it is INPUT's observation that understanding a client's special needs is often vital in providing valued-added service.

6. OS ENVIRONMENTS PREFERRED

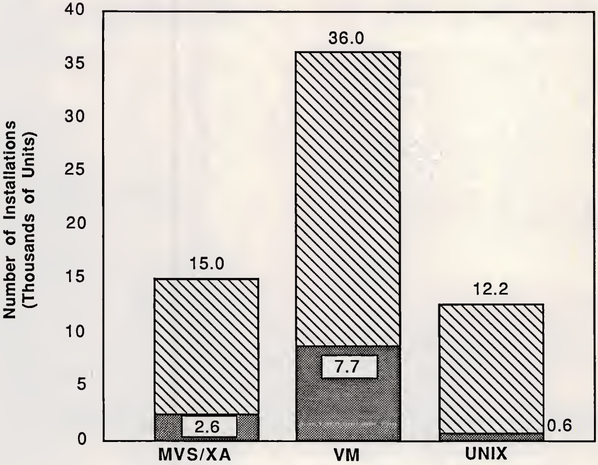
- Users were asked to rate their concern with regards to the operating system used by an RCS. Several noted that, generally, the RCS operating system would not be directly addressed by users. Others commented that the operating system was important since it would affect their ability to convert an RCS application to an internal system.

- The operating systems users preferred mirrored those currently used internally.

- Exhibit V-7 shows INPUT's findings on the operating system population, with projected installations by 1991. More information on this topic, including detailed forecasts by computer size, can be found in INPUT's report IBM Operating Systems Strategies.

EXHIBIT V-7

MVS/XA, VM, AND UNIX INSTALLATIONS, 1986-1991



	MVS/XA	VM	UNIX
AAGR*	42%	36%	83%

1986   1991

* Average Annual Growth Rate

7. COMMAND STRUCTURES

- INPUT assumed that having the same command structures on an RCS service as used internally was an important user issue, particularly when talking about DPS configurations. This is probably the case with regard to end users (i.e., non-IS); however, respondents to the survey rated this feature slightly above midpoint, reflecting acceptance of the nonuniversality of software command structures.

- Exhibit V-8 shows user ratings of these concerns relative to remote computing services.

8. EMOTIONAL FACTORS

- Since DPS configurations incorporate a user site machine, users may have an unrecognized element in considering this option--pride of ownership.

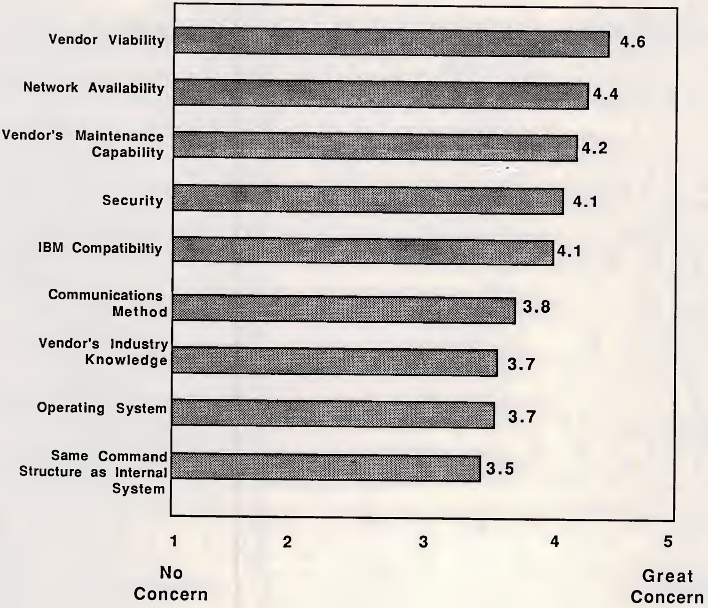
- This element is often hidden in a cost benefit analysis as the strategic need to control the company's processing, the need to be independent of a specific vendor, or the need to maintain security over the data base.

- Strong corporate IS departments have often been opposed to independent departmental use of remote computing services as abrogating IS responsibility and as possibly redundant. IS felt it may be required to support a system with which it had no previous involvement or planning input.

- However, IS has come to recognize that it cannot always respond to departmental needs in a timely manner, making an external solution appropriate in many cases. IS should be involved in any departmental initiatives toward third-party information services to insure compatibility with existing systems (if required) and to track corporate needs for future IS response.

EXHIBIT V-8

USER RCS CONCERNS



9. PERSONNEL FACTORS

- In an age where computer professionals are often scarce, highly paid, and prone to "job hop," large organizations are inclined to reduce their need for such personnel, and small organizations either want to eliminate them or not hire them in the first place. DPS configurations do not require IS professionals to manage the facility.

C. DISTRIBUTED PROCESSING SERVICES ELEMENTS

- DPS consists of a set of subsegments of the information services market. These subsegments include:

  - Equipment leased under DPS agreements and purchased from the DPS vendor specifically for the DPS configuration. Only the costs of equipment supplied under a DPS service agreement is included in the market estimates.

  - Software licensed or purchased specifically for the DPS configuration, accessed on either the user-site processor or remotely.

  - Processing services in all of its varients, including data base access, transactions, and messaging. These costs may be bundled or discounted for the DPS user, but only those included in the service contract are counted in the forecast. Usage may be measured in terms of resource units, transactions, character counts, connect time, or a combination.

  - Networking, including leased lines and the costs of VAN usage for the link between user site hardware and RCS central processors when bundled with the service contract.

- Professional services covering any customization, training, support, documentation, maintenance, facilities planning, and facilities management of DPS data centers. Again, only those services covered in the contract are included in the forecast.

- Other services such as off-site printing and media conversions related to the distributed processing service are excluded unless bundled with the DPS service.

- Exhibit V-9 shows INPUT's forecast for distributed processing services.

D. FLAT GROWTH, BUT DPS HAS AN IMPORTANT ROLE

- As shown, the market for distributed processing services is relatively flat.

  - Higher growth is forecast initially due to demands for distributed processing services in the medical and banking segments. This demand should level off later in the forecast period.

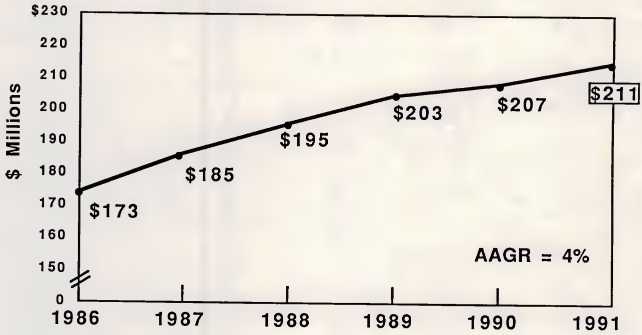
  - Many general business DPS users will move to internal solutions. This will reduce their expenditures for RCS processing but increase expenditures for software, equipment, and maintenance.

  - As these users are "lost," new accounts will be signed, leading to a maintained market affected by competitive pricing pressures--less from other DPS offerings than from the comparative costs of internal systems.

- This lackluster performance does not mean users should be reluctant to consider the distributed processing service delivery mode. Some settings will use DPS long term because of the support provided by the RCS.

EXHIBIT V-9

DPS FORECAST



LOW GROWTH

New Accounts Replace Internal Integration

Micros/LANs/MUS Compete at Low End

- In the majority of cases, however, DPS is a transitional strategy, a bridge between full RCS usage and fully internalized solutions. Thus, DPS fills an important middle ground, as illustrated in Exhibit V-10.

E. PROFIT MARGINS

- According to vendors who were willing to comment, the profit margin for DPS services is very attractive, in some cases as high as 45%, although more likely in the 25-35% range.

  - This is primarily because the customer is integrated into the operation, performing many of the tasks involved, resulting in lower vendor personnel costs to support users.

  - Further, the vendor can leverage the software research, development, and maintenance effort.

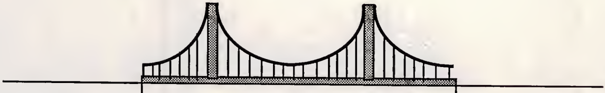
  - Sales expenses can be charged to selling applications and data bases and not the delivery mode.

- Contracts for DPS services are flexible, reflecting the margins available and also due to the variables which can be included.

- Users should keep this high profitability in mind in their negotiations for DPS-type services.

EXHIBIT V-10

DPS BRIDGES OPTIONS



FULL RCS

- On-Line Applications
- Networking
- Storage
- Services

DPS

- Monthly Fees
- Revenues from Other RCS Services

INTERNAL SYSTEMS

- Software Sales
- Continuing Services

F. THE TREND TOWARD USER DPS EQUIPMENT OWNERSHIP

- Distributed processing services fit users who will never have an internal solution and serve as a bridge between full RCS services and a user's developed, fully internal solution.

- By providing the user dedicated processor, the vendor delays the migration to an internal configuration that does not use remote computing services.

- However, by bundling hardware and software into monthly fee-for-service combinations, additional, unaccustomed financial strains on vendors have developed. Vendors need to support the growing "lease pile" of hardware installed with the user, but owned by the vendor.

- The observable trend is for vendors to reduce their capital expenditures and the associated risks by getting users to take title to the hardware.

  - This can occur through favorable pricing or by supporting the user in buying the equipment directly from the manufacturer or distributor or on the used market.

  - With the user now owning the DPS-associated processor, the vendor's pricing mix can be changed accordingly, and while the monthly fees are reduced, with care the vendor's profit margin can be increased.

- The benefits to the user owning the equipment may be both emotional and financial.

  - Pride of ownership may be a factor.

  - Users will have maintenance agreements, often with the RCS vendor's maintenance organization.

- Depreciation and investment tax credits on larger systems may be beneficial, although as this is written, it appears proposed tax law changes, when considered with declining equipment costs, will result in essentially no overall change.

- The next chapter looks at several current and past users of distributed processing services to identify instances where DPS' benefits have fit practical needs and to illustrate the transitional role of the delivery option.

VI DISTRIBUTED PROCESSING SERVICES CASE STUDIES

VI DISTRIBUTED PROCESSING SERVICES CASE STUDIES

- This chapter describes several current and past users of distributed processing services.

- Each case has unique circumstances, with the reasons for a DPS configuration varying by industry and specific user need.

A. A HOSPITAL GROUP

- This company operates four hospitals. For several years it used RCS services for financial systems, and became aware of the same vendor's DPS hospital management applications not from the vendor, but from another hospital.

- When data processing requirements increased due to a growing patient load, changes in the industry, and a management contract with an additional hospital, several IS vendors were evaluated. The goal was to move data entry to the source of data collection, front-ending a more complicated and integrated system.

  - It made sense to stay with the vendor they were using for financial applications.

- Also, the hospital had developed their own in-patient data base, but they also required the significant management applications, on-line storage, and ancilliary services offered by the RCS.

- In retrospect, the IS manager is glad this vendor was chosen over others which have since gone out of business.

- The vendor's industry specialization was a key selection point. The evaluation task force felt more comfortable due to this focus rather than with an RCS vendor who had a "sideline" in hospital management systems.

- The group currently leases the software and peripherals on a monthly basis. The minicomputer which hosts the internal systems and data base and accesses the RCS was purchased from the vendor, cutting monthly costs considerably.

- Three networks link to the DPS system: one hubbing on the DPS mini; the group's internal network, which incorporates a newly installed LAN-linked micro cluster; and a network supporting business office inquiries from dumb terminals.

- A key advantage realized is the vendor's level of customer service.

  - The group's small internal IS department is primarily staffed with computer operators. An entirely internal system would require more highly skilled personnel to handle problems and perform data processing functions.

  - The vendor provides 24-hour remote diagnostics and hotline support. It coordinates repairs with the hardware vendor, as needed.

- Another advantage identified is the security of the centrally stored data base, which was built over a five-year period. The vendor is responsible for

maintaining the data base and backloading changes required under industry and regulatory reporting rules.

- The primary disadvantages identified are cost and some limitations.

  - Billing is partially based on the number of transactions and reports requested.

  - Currently, trial balances cannot be downloaded to micros for manipulation, resulting in ad hoc reports based on only a portion of the data base.

  - The IS manager would like to manipulate the data more freely to generate more accurate analysis.

  - To its credit, the vendor is enhancing the system with additional features to support such capabilities.

- The vendor is also adding an application to track the hospital's historic out-patient, in addition to in-patient, records. The administrator's staff had tried this internally with little success.

- The hospital feels it is already decentralized, with more movement in this direction to follow.

  - This is primarily because it seems to be most efficient to have data entry take place at the data creation point; otherwise, effort is duplicated by documenting information for data entry as a separate operation.

  - Further, as users become more sophisticated and as additional micros are installed, decentralization results.

- While the vendor supports the transfer of insurance records to carriers for claims processing, the hospital does not currently take advantage of this "value-added" service, although it is investigating its options for this type of electronic data interchange.

- The hospital will pilot test a package allowing physicians to dial into the system using IBM PCs or compatibles to retrieve and review records. Security for this type of access is a concern. The vendor's offered package does feature a call-back mechanism with the physician's password acknowledged, the link disconnected, and then reestablished from the system end.

- The IS director expects the vendor to assist in the integration of their equipment with the service, noting that a work group cluster linked on a local area network was installed with such help. However, the vendor is not expected to help in integrating internally developed software with the service; rather, recommendations on specific packages and hardware which will easily integrate are given.

- Although the service could be called a turnkey solution (except they are tied to the RCS host), the IS manager feels strongly about customization. Instead of a generic turnkey system, the system should include tools to allow customization to specific, and perhaps unique, requirements.

- An unbundled configuration is preferred here because the exact components of any package should be identified, particularly in support and installation areas.

  - Often these elements are overlooked by the hospital's administration which must review the budget proposals for new or enhanced services.

  - Since vendors often bill by the hour for these services, identifying them separately is important.

- The IS manager is glad the RCS will be installing the latest version of the VMS operating system, not because it makes any significant operational difference to them, but because it indicates that the vendor is keeping up with the latest technologies.

- It is highly unlikely that the hospital would change vendors in the near future because it is satisfied, reporting only one major problem in five years. However, when the contract expires in three years, alternatives will be evaluated as standard procedure.

- The hospital administration's policy is to focus on the business it knows best--running hospitals. It doesn't want to get into the data processing business. Accordingly, the distributed processing service provides the applications, support and specialized orientation needed to manage its information--a function which is becoming increasingly important in the health care industry.

B. A SMALL BANK

- All of this bank's applications, with the exception of real estate loans, are handled through a DPS configuration offered by a vendor's industry-specialized unit.

  - Real estate loans, working against a locally generated data base, have been on a separate processor for years.

  - Although the RCS vendor has a relevant package, it was not deemed cost effective to convert to an external service.

- The DPS system, installed four years ago, is described as remote capture, with all data entered into the user site processor, owned by the bank, and transferred to the RCS at night.

- The DPS configuration was chosen primarily because of limited manpower.

  - The banks comptroller also feels the DPS provides more control than an internal system.

  - The bank is reluctant to have one person, such as a programmer, responsible for its critical data processing, making the concern a security issue.

- Although using a distributed processing service, the bank considers itself highly centralized and expects to stay centralized due to economies of scale, desire for control, security concerns, and needs for internal standards.

- The bank prefers to have a DPS service bundled as a package because its internal data processing capabilities are minimal.

- Curiously, the RCS vendor's industry-specific knowledge was rated at mid-range in importance, with reliability and daily functionality more important than the "bells and whistles" such specialization may represent.

- The bank would likely use independent outside consultants to plan future needs but would be skeptical about using an RCS vendor's consulting services primarily because of the vendor's self-interest. However, a chosen vendor's consulting services would be used because "we need all the help we can get."

C. FROM INTERNAL, TO TIMESHARING, TO DPS, AND BACK AGAIN

- This case illustrates how DPS configurations fit between a customer's use of timeshared remote computing services and an internal application. It also illustrates how a vendor can generate RCS income by restricting sales of an application, permitting only remote or DPS access.

- During the period immediately following divestiture, a Bell Operating Company's (BOC) data processing department was "up to their ears" with activities mandated by various decrees and judgements.

- Simultaneously, the marketing department responsible for selling network services needed to ramp up to participate in the new environment. The changes divestiture had wrought meant new competitors and momentum could not be lost.

- Marketing needed an application to track the customer base and generate reports using various marketing criteria. While they did have an internal mainframe system, it required a programmer to write custom reports, with turnaround varying between two days and two weeks.

    - This was unacceptable. Time was being wasted and opportunities lost.

    - They wanted an easily used system that product, market, and account managers could use in a true "user friendly" manner.

    - They wanted reports within the hour.

    - They realized they could not ask IS for help.

- An RCS vendor's marketing-oriented application was identified. The package could be tailored to specific needs with English language menus as the user interface, allowing non-data processing personnel to write their own reports.

- The application was not available for installation on the company's mainframe and so initially it was accessed via RCS timesharing. This option was welcome as it allowed the department to validate that the system could meet its criteria for ease of use and reporting speed.

- The timesharing option could have continued; however, because of the costs involved, only part of the customer data base was uploaded to RCS storage.

  - Storing the entire data base would have, in the words of the marketing director, "blown the budget out of the water."

  - Of course, this limitation affected the value of the timesharing mode.

- Accordingly, a DPS configuration was chosen, with the software installed on a dedicated IBM minicomputer which the BOC purchased.

  - The entire data base could be loaded and accessed without concerns that the clock was ticking and charges being accrued.

  - Terminals as well as PCs equipped with terminal emulation software and boards can access the mini.

  - Maintenance is provided by IBM.

  - The link between the processor and the vendor's data center is used primarily for monitoring; software updates are manually loaded by the vendor's staff.

- In addition to the vendor-supplied application, another, developed internally, tracks proposals and sales made by the BOC's authorized agents, maintaining lead information, computing the value of sales, and sales close ratios, and other information.

- The department pays $20,000 in monthly fees to the RCS under a two-year agreement and also pays chargeback fees to the BOC's central IS department which houses the dedicated processor.

- The department does not plan to extend the agreement after it expires next year. Since the vendor now offers the application for sale, the department is evaluating whether to install it on the corporate mainframe or to continue the IBM minicomputer configuration without the RCS link.

- The only problem identified was political and unrelated to the software, equipment, or vendor--getting cooperation from corporate IS to get the application up, running, and fine-tuned to the department's specifications.

  - Concerns were raised about the department's relationship with IS.

  - IS could not fully understand why the marketing department elected to provide its users with a DPS service.

- The opportunity that divestiture created here illustrates a vendor targeting a timely need.

  - Marketing telecommunications services in the new, post-divestiture environment assumes new importance and required IS support.

  - However, IS was besieged, in this case by external events, and could not be counted on to upgrade a strategically important application.

  - Here, both the vendor and the user responded appropriately to their mutual benefit with the DPS option.

D. A DPS APPLICATION FALLS INTO DISUSE

- A $500 million office furniture design and manufacturing company developed an application to help clients design configurations for maximizing space, worker comfort, and productivity in the workplace.

- The application was intended for access not only by sales consultants and space planning specialists within the company, but by external consultants, key customers, and dealers as well.

- A DPS configuration, built around a DEC minicomputer, and linked to the RCS vendor through a leased line to the vendor's VAN was placed in the marketing department.

  - The department was some distance from corporate headquarters and central IS.

  - Other vendor-supplied software was installed to track projects, inventory, sales, investments, and for intracorporate messaging between users, departments, divisions, and key customers.

- After four years of regular remote access by clients and internal staff located throughout the U.S. and overseas, use of the facilities planning application fell to occasional, and mostly internal, use.

- Other applications remained active. For example, three major dealers check inventory by dialing in via a value-added network. However, the original reasons for using a DPS configuration became less important as the firm grew its own internal IS department.

E. A LUMBER AND PAPER PRODUCTS COMPANY

- This firm uses RCS services linked to dedicated micros which are provided by the RCS vendor under a leasing arrangement.

- Several industry-specific applications are accessed via DEC MicroVaxs:

- A production scheduling model for lumber and plywood processing plants.

- A timber evaluation package which rates raw material quality and quantity based on maturation schedules and other factors.

- A paper manufacturing machine scheduling system.

- The DPS service costs the company approximately $5,000 monthly. This covers equipment leases and application access with communications costs billed separately. While the leases are fixed-price, the application access costs have increased over the past year due to added manufacturing facilities and the need to evaluate more timber.

- The major reason for using DPS is that the software required is unavailable for the IBM equipment the company now owns.

  - By accessing it via DPS, the company has an alternative to buying equipment specifically for these application, an inappropriate action since its mainframes are not amortized and are used for other corporate needs.

  - Another unacceptable alternative is to license applications which work on existing processors but which would not meet the needs as well as these specific packages.

  - Developing their own applications is out of the question. They are complex, and the company does not have the internal expertise nor time to write, debug, and implement the software.

- The major disadvantage cited in accessing these applications via DPS is the monthly cost.

- However, IS acknowledges that licensing the software for internal use, if it was possible, would probably equal the annual costs, especially if machine time was charged back to the end-user departments.

- Further, by remotely accessing the applications, the company stays flexible. If another, more suitable package becomes available, they can easily shift to it.

• The company is considering an on-line order entry system and electronic data interchange. It is evaluating the results of an industry-wide EDI pilot program and looking at an RCS offering specifically oriented to the paper products industry.

• This company feels it does not have sufficient staff expertise, internal resources, nor the inclination to handle all of its own processing.

  - Accordingly, it uses independent consultants and the professional services of its RCS vendor for planning assistance.

  - Its DPS-associated hardware is also maintained by the RCS, while other equipment is serviced by the manufacturers or by third-party maintenance vendors.

• The company expects its RCS vendor to provide help in integrating its hardware and software with the service, as required. It prefers a turnkey solution to help keep its decision making simple, with the vendor providing a completely bundled package including communications, expendable supplies, processing, and maintenance.

• Typically, when an end-user department manager requires a specific RCS application, as was the case with the DPS solution, the IS manager and a corporate operations vice president must give joint final approval to the request.

- Decision making at this company must often occur within short timeframes, and is, therefore, delegated to the responsible departments. Because of this, and because of its size, the company feels it must maintain a decentralized strategy for its information systems.

F. AN AIRLINE COMPETES WITH DPS

- A regional airline determined that in the newly deregulated environment it needed a computer solution to help it optimize its fare schedules.

- Market competition requires offering discount fares; however, the company needs to limit this by allocating only enough promotional discount seats as necessary to generate passengers. It determines how many are needed by forecasting full fare demands and subsequently allocating the discount inventory.

- An automated system was needed quickly as rivals began promoting their own discount programs. However, central IS was unable to develop the application due to the backlog. Meanwhile, an RCS vendor's DPS package was available immediately.

- There was some concern. This vendor was in financial trouble. However, by addressing the issue directly and ensuring that the application would be available even in the event of bankruptcy, the evaluation team was satisfied that the risks were minimal.

- The vendor did know the air travel industry, and this was important. An application which did not directly address the company's needs would be quickly rejected.

- When INPUT interviewed the department manager, the system had only been used for a few months by the four-member staff and the manager was new. They have not had enough experience to recognize or to realize all the benefits.

  - For example the manager was uncertain if applications other than the optimization package were installed on the DPS processor.

  - They have not yet considered if other applications would be helpful.

  - The manager also did not know exactly how the system worked with regards to the link between the distributed processor and the RCS--a testament, perhaps, of the system's transparency.

- The department members are not IS professionals, and the application is menu driven, allowing users to easily design and extract needed reports.

- The manager did not know the monthly costs but felt that it was still "too much" and that it might be possible to bring the application inside to save on fees. IS is evaluating this possibility.

- IS has been cooperative from the start, assisting in the smooth installation and understanding the reasons for bringing in an "outside" service.

- The department manager confessed to being uncertain if this is the best package available for the function, knowing about others. He thinks it may be less expensive to handle the department's functions manually with more analysts assigned the task. He questions whether the algorithms used in the optimization package are effective in the "ultradynamic environment" of deregulated air travel.

- Despite these musings, the manager acknowledges that his company is succeeding over its rivals which do not use an optimizing package, although

the application is only one of several contributing factors. The primary rival firm reportedly uses daily reservation data to help it manipulate inventory, an apparantly ineffective approach.

- Regardless, the system only provides the data. Experienced analysts who understand the market add the value, making the information useful and the benefits possible.

G. CASE STUDY ANALYSIS

- Exhibit VI-1 summarizes the applications, reasons, and status of these users of distributed processing services.

- The hospital group has increased specialized information systems requirements, but a corporate philosophy to focus on its core business. The growth of the small IS unit into a full, professionally staffed department is beyond its mission. The DPS thus fits the environment and the need.

- Similiarly, the small bank has specialized needs and also does not want to make its processing solely the responsibility of a single staffer for security reasons.

- The BOC marketing department had immediate needs which could not be addressed by corporate IS because of divestiture and the associated industry changes which placed new demands upon it.

- As the furniture company's IS department matured, simultaneously the primary application hosted by the DPS processor fell into disuse. The original rationale for this configuration became moot for two reasons.

EXHIBIT VI-1

CASE STUDY SUMMARY

CASE	APPLICATIONS	REASONS FOR DPS	STATUS
Hospital Group	Financial Management, Data Base	Industry Focus Manpower Limitations	Client Satisfied, Change Unlikely
Small Bank	All Except Real Estate Loans	Manpower Limitations Security	Continuing Usage
Bell Operating Company	Marketing	IS Unable to Assist Due to Divestiture Requirements	Will Likely Bring Applications Totally In-House
Furniture Manufacturer	Custom Design Package, Inventory Project Mgt.	Department Isolated from IS	IS Expanded Now Able to Support Remote Site
Paper Company	Specialized Production and Scheduling Packages	Needed Applications Unavailable for Corporate Mainframe	Usage Continuing
Airline	Full Fare Optimization	Deregulation Created More Competitive Environment; IS Unable to Develop System	Recently Installed; May Ultimately Bring In-House

- The lumber and paper products company still uses a micro-based DPS, primarily because the needed industry-specialized applications are only available in this manner. Also, the company wants to stay flexible should a better application become available for its mainframe.

- The airline found the DPS application addressed a specific need and could be used by non-IS personnel. However, the department manager appears unconvinced that the service is more cost effective than manual methods. Further, migrating the application to an internal host or finding another application are future possibilities.

- Clearly DPS serves situations where there is no IS department, where the end-user department is isolated from IS, or for needs IS cannot support in a cost-effective or time-effective manner.

- DPS also fits situations where industry-specific applications are available, but neither full-time internal licensing nor remote access are appropriate due to the amount of projected usage or the processing power required.

- It is important that the DPS be easily used by departmental end-user professionals who may not be computer trained and that applications closely fit the function in procedures and jargon. This means industry- or function-specific software tailored to unique circumstances.

- The requirement for easily used applications also applies to any general business applications which may be hosted on the DPS processor.

- The next chapter profiles vendors offering general business and industry-specific distributed processing services.

VII CORPORATE PROFILES

VII CORPORATE PROFILES

- This chapter first profiles those companies providing clearly defined general business, minicomputer-based distributed processing services, then provides examples of industry-specific DPS or DPS-like configurations.

- Finally, the chapter presents examples of potential suppliers of distributed processing services and examples of how RCS vendors are supporting microcomputers in the RCS delivery mix.

- While there are several industry-specific examples given, others may have been overlooked despite an extensive review of remote computing service vendor offerings since they are not specifically identified by vendors as "distributed" or "dedicated" processing services.

- Users are urged to consider jointly developing customized DPS configurations with their remote computing service vendors if the vendor does not provide applications currently meeting unique needs.

A. DISTRIBUTED PROCESSING SERVICE VENDORS - GENERAL BUSINESS

1. AUTOMATIC DATA PROCESSING, INC. (ADP)

a. Background

- ADP (Roseland, NJ) was formed in 1949 as Automatic Payrolls, Inc., with the name changed in 1960.

- Since the early 1960s, ADP has had an active acquisition program to diversify from its primary business of providing payroll services, which still provide a major share of its revenue.

- The company provides RCS services to banks and other financial institutions, supplies on-line data bases, supports collision estimating for the insurance industry, and has services for automotive dealers.

- ADP's Network Financial and Communications Service group provides remote and on-site distributed processing though the Autonet international VAN.

b. Onsite

- ADP's Distributed Processing Service, called Onsite, was introduced in the late 1970s.

- DEC 2020 processors serve as user site hardware, with services targeted to midsized companies in all industry and government segments.

- ADP also provides a service called Shared Onsite, with several customers sharing a dedicated processor located at the central Ann Arbor data center.

- Contracts run up to five years, with equipment leasing, training, and hotline support included and maintenance contracts available separately.

- ADP-owned software is available for client internal licensing; however, software licensed to ADP by other providers requires agreements with that vendor.

c. Datasite

- Another DPS-like offering is Datasite, which includes hardware and software supporting off-line data entry. After data is placed in the system, the Datasite configuration communicates locally stored information to the RCS and retrieves data and/or reports for local use or printing options.

d. Strategies

- Internal installations are seen as the primary competitor to ADP's Onsite services. Therefore, ADP uses competitive, flexible, and often creative pricing to meet this competitive threat. Further, ADP's consulting services are seen as a valuable means of keeping and adding customers.

- ADP has a reputation for being conservative in its approach to new technologies, preferring to stay with proven hardware and communications techniques.

2. CONTROL DATA CORPORATION (CDC)

- CDC has several services fitting the definition of DPS.

a. Distributed Service

- Distributed Service is offered through the Business Information Services division located in Greenwich (CT).

- IBM 4300-based service was introduced in 1983 and Wang VS series-based service in 1985.

- The DPS processors act as nodes on CDC's leased line network, connected to Control Data's Operations Center in Cleveland for remote operations and support.

  - Remote diagnostics and hardware maintenance are coordinated at the operations center.

  - Software updates and patches can be downloaded electronically, but generally are sent by tape.

  - The Operations Center provides access to the Management Application System (MAS - a generic term for CDC's application software), CDC's Call/370 and Call/Plus timeshared operating systems, and gateways to external data bases.

- Management Application Systems are customized for specific industries.

  - Marksman is oriented to advertising, promotion, and other sales activities.

  - Treasury Command is a corporate financial management package which links to in-house accounting and general ledger systems.

  - Yield is used by travel-related industries to maximize revenues. An airline Yield Manager, for example, will load detailed reservation information from the corporate mainframe into a dedicated distributed processor, using the Yield applica-

tion to analyze specific flights or hub traffic. The savings that can result by optimizing resources is said to justify a dedicated system.

- MAS is available only for IBM and Wang processors. It supports multiple users, shared data bases, integrated applications, and software "seed modules" which can be custom tailored using fourth generation languages.

- The user site hardware can be leased as part of the DPS package or bought from CDC (an IBM value-added reseller), the manufacturer, or on the used market.

- The user site hardware can also link to the client's internal host and network for transparent access to corporate applications, data bases, and internal communications to workstations served by the host.

- Exhibit VII-1 shows the configuration of CDC's Distributed Service.

- Users do not require professional staff to support the Distributed Service's machine which can be located in the end-user department. Rather, administrative and clerical staff can change paper and perform other routines. Usually, however, clients will colocate the machine with corporate central processors.

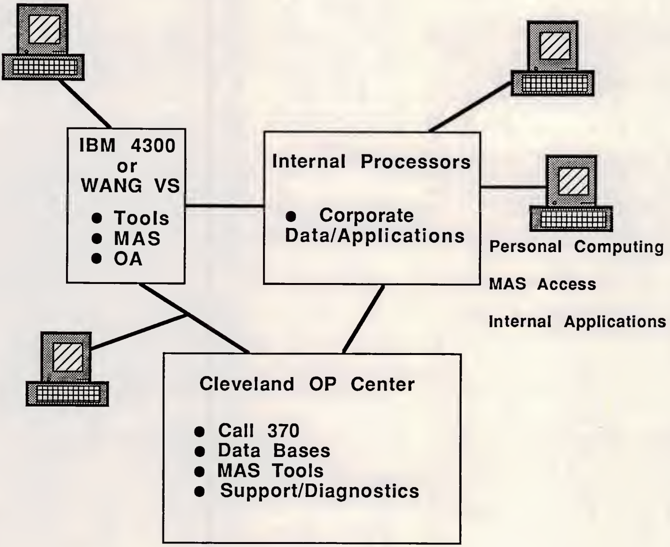
- The service is sold either bundled or unbundled, with prices ranging from $20,000 to $55,000 per month depending on features and options included.

  - RCS resources are offered at a discount, and the software can be licensed perpetually or for two years.

  - Two- or three-year DPS contracts are offered, with renewals negotiable for various periods.

EXHIBIT VII-1

CDC - BIS DISTRIBUTED SERVICE



- There are currently no provisions for crediting these fees to software or hardware purchases.

- Another service available through CDC's Distributed Service is a bank cash management service for single and multibank reporting, debit/credit reporting, and automated clearinghouse transfers. The service can also be delivered through micros.

b. Decimus

- CDC purchased the California operations of the Decimus Data Services Corporation from BankAmerica Corporation in May 1985.

- Decimus provides processing services to approximately 200 small and midsized California banks, with up to $500 million in assets, and to several federal bank insurance and regulatory agencies. The unit is now part of CDC's Business Services Group.

- Burroughs' 1900 Series minicomputers with associated peripherals are located at the user site, with major processing handled at the San Francisco (CA) service data center. The federal agencies (located nationally) access the system through microcomputers.

- Decimus is intended for banks and agencies who are unable or unwilling to purchase major hardware or software, who lack programming talent, and who benefit from the "value-added" services provided in monitoring compliance regulations and market research.

    - For example, the CDC unit helps banks develop data processing support beyond accounting and management applications for promotion and marketing.

- Unlimited training of bank employees is provided, billed as a percentage of the monthly services charges.

- The Burroughs equipment is usually leased to customers who are also responsible for the leased line to the data center.

• There is currently no provision for applying monthly fees to equipment or software purchasing; however, the software provided by Systematics (Little Rock, AR) is available from the provider for client licensing.

• The software supports messaging between bank branches and will be used to distribute other information such as current interest rates.

c. Other Distributed Processing Services

• Other CDC links support the integration of micro software with remote computing services. For example:

- Control Data Business Centers (CDBC), which provide batch and remote batch processing and software to small and medium-sized companies, markets Orchestrator software for IBM PCs and compatibles. Orchestrator links CDBC's processors with a client's microcomputer.

- CDC's Scientific Information Services division provides Vista microcomputer software for distributed processing.

  . VistaDRAW is a graphic package using host computer plot data for mapping on a micro.

  . VistaSIGMA is a front-end to major engineering packages, allowing users to build data on a micro, then call the host computer for job submittal.

- These implementations provide flexibility in accessing and transferring data and in moving workloads to the appropriate resource--micros, in-house mainframes, departmental minis, or CDC's central mainframe and supercomputer processors.

d. Strategies

- BIS' Distributed Services is targeted to all companies with revenues in excess of $100 million, but Distributed Service is seen as one optional delivery mode which combines in-house resources with outside computing services in a single integrated system. The application is the main selling point not the delivery mode.

- Before introducing DPS, all processing was handled remotely at the BIS data center. Now the philosophy is to "process where it makes the most sense," leading to the introduction of IBM- and Wang-based distributed processing services.

- Distributed Service's strengths, according to the vendor, are:

  - Control of strategic management applications and data by functional managers for maximum control and security.

  - Fixed-pricing.

  - Large-scale processing capabilities provided obviating development and maintainence of a corporate data center.

  - Integration of decision support and office systems.

- CDC sees its primary competition for Distributed Services as not a rival firm, but rather a customer's internal solution.

- Control Data sees its Distributed Services as providing a nearly automatic transition or evolutionary step from RCS processing to corporate-based internal processing, supporting the same applications which can be accessed through the vendor's proprietary Call/370 timesharing. It is also a cost bridge between RCS and internal solutions, costing less than RCS but more than a fully internal system.

- Decimus officials have observed that customers who have gone to internal processing often have later need for additional resources to manage information as they expand services. This leads the customer back to the service bureau not only to meet needs but to benefit from the consulting services and industry expertise the vendor provides.

3. CROWNTEK COMMUNICATIONS, INC.

a. Background

- This Markham, Ontario, company is a member of the Crowntek group, which in turn is part of Crownex, Inc., an integrated services company involved in financial services and health care as well as information technologies.

- Earlier known as Datacrown, the company was formed in 1972 from the merger of a subsidiary of Crown Life Insurance Company and another data processing company.

- Crowntek Communications handles IBM-based processing and network services, while other divisions handle value-added integrated computer systems marketing, software, consulting, and education.

- Crowntek's processing activities are limited to Canada and utilize its Canadian National Communications Network to deliver services.

b. Dedicated Processing

- Crowntek's distributed processing services are called Dedicated Processing.

  - Dedicated Processing is oriented to organizations requiring their own mainframes. Often, however, the provided processor serves as the company's sole data center. The relationship with the RCS is typically for back-up and overflow processing.

  - This offering is a hybrid of facilities management and DPS since the service provides data center design, equipment and communications technology selection, and contract management. Crowntek also handles installation.

  - IBM minis and mainframes (including the 3090), as well as plug compatible mainframes, serve as user-dedicated processors located at either the user's premises or in Crowntek's facilities.

  - Approximately 10 accounts are now active, with government agencies the largest users, along with several large financial services companies, a distillery, and a research institute.

  - Canada Trust (Toronto, Ontario) is currently under a five-year contract for on-line and distributed processing services to branches across Canada for mortgage, corporate shareholder services, personal and pension trust, real estate, and human resources applications. Crowntek provides distributed printing services as well.

- Canadian government agencies are dedicated processing users because of government procurement policies which limit data center expansion and cost control measures which see traditional timesharing as difficult to manage.

c. Strategies

- Crowntek coined the term "Shared Processing," a concept representing long-term processing service contracts replacing in-house computers.

- In addition to government accounts, Dedicated Processing is directed primarily to small and medium sized companies, which are currently using traditional timesharing services or who were using non-IBM mainframes and are now concerned about internally-managed data processing.

- Crowntek says it is committed to maintaining computer power in excess of client needs. The company is developing a range of intelligent network services as well as adding additional facilities management capabilities.

4. GENERAL ELECTRIC INFORMATION SERVICES COMPANY (GEISCO)

a. Background

- GEISCO (Rockville, MD), established in 1984, is a division of General Electric. It provides the Mark*Net VAN, available in over 750 cities worldwide, with 600 access points in the U.S.

b. Mark III DDP

- This DPS offering was introduced in the late 1970s, and while current clients are supported, GEISCO no longer markets it. INPUT estimates there are approximately 20 existing users operating under annual contracts, mostly in the Fortune 1000 class.

  - DDP in this context stands for distributed data products.

  - Customer site hardware consists of Texas Instrument 990 minicomputers (called Marklink processors) supporting 16 terminals, two

printers, and storage peripherals linked to the network through leased lines, dial-up modems, or in dial-back configurations. The user hardware is leased to the customer.

- Maintenance is provided through GEISCO's service organization.

- The environment for Mark III DDP is an application-specific user work group. At one time, the Mark III DDP processor may have been the customer's only processor or there may have been a central mainframe, with the DPS configuration dedicated to a specific function.

c. Strategies

- The company says it is no longer marketing Mark III DDP (although it will provide new and existing customers with service upon request) because it found customers reluctant to purchase equipment dedicated to specific functions and also because the offering lacked office systems software.

- Perhaps more important is GEISCO's recognition that micros, either supplied by GEISCO or customer purchased, are increasingly being used to replace interactive, on-line RCS usage in a pseudo batch-type operation, with the micro performing some of the processing.

- Also, micros are more flexible, more economical, and have a wide range of software available. Accordingly, GEISCO is focusing on micro support for RCS services and the connection of customer-owned minicomputers to the network.

B. INDUSTRY-SPECIFIC DPS OR DPS-LIKE SERVICES

1. AMERICAN HOSPITAL SUPPLY

- This Evanston (IL) manufacturer and distributor of medical equipment offers the ASAP (Analytical Systems Automated Purchasing) system, which allows customers to use terminals, touch-tone phones, portable terminals, bar code scanners, and processors of all sizes to enter orders.

  - Over 500,0000 products are available to some 5,000 customers.

  - Messages and special requests can be sent to customer sales representatives.

  - The system can translate between a customer's stock numbers and AHS's order numbers and can provide documentation sorting and customized management reports.

- Optionally, the system can automate ordering, with the ASAP computer compiling a list of recommended purchases for electronic approval.

- ASAP is extended to American Hospital Supply's suppliers and is credited with helping the company achieve market dominance.

2. BOEING COMPUTER SERVICES COMPANY (BCS)

- BCS (Seattle, WA) was formed as a subsidiary of Boeing in 1970, consolidating 13 separate IS organizations. It provides computing services to over 1,500 governmental and commercial customers. The company specializes in manufacturing, decision support, and financial planning. Engineering and scientific research is supported with BCS' CDC Cyber large-scale mainframes and a Cray X-MP.

- Boeing has several services which incorporate microcomputers in a DPS configuration. Examples include the recently (January 1986) introduced Petroleum Gallery.

  - Targeted to the oil and gas industries, it consists of a suite of software packages designed for IBM PC XTs and ATs which communicate with the BCS network for access to data bases and advanced supercomputer applications.

  - Applications include sophisticated mapping. Data bases include historic and statistical information as well as digitized map data.

- BCS says it is targeting the currently declining petroleum industry to build on and leverage its industry services (offered since 1977) and because it believes the current economic downturn preludes an upturn.

- Further, the company believes there is a need for integrated information services during a downturn to improve productivity by reducing exploration risks and reducing staff.

- BCS says future enhancements for the Petroleum Gallery include artificial intelligence and expert systems to assist in resource exploration and oil drilling.

- Other workstations linked to BCS MAINSTREAM applications are offered, such as:

  - The EIS (Executive Information Service) MicroWorkstation is oriented toward financial planning. It is based on various IBM micros (i.e., PCs, XTs, ATs). They serve as pre- and post-processors and automate log-on functions. The purchase price includes credit toward BCS network processing.

- An engineering workstation based on DEC PDP-11/23 processors and peripherals, with communications to the BCS supercomputer service called Mainstream-EKS, used primarily by scientific researchers, statisticians, and engineers.

3. CABLEDATA

- CableData (Sacramento, CA) was founded in 1965 as U.S. Computer Systems and provides interactive and remote batch processing as well as turnkey systems to the cable television industry.

- INPUT estimates that the majority of the private company's revenues are derived from distributed processing services to over 1,000 CATV companies which transmit subscriber information to CableData data centers from intelligent workstations linked via leased lines to Tandem NonStop minis at the operations center where bills are prepared and mailed.

- Other applications are order entry, scheduling, installer check-in, converter inventory control, payment depositing, collections, refunds, management reports, and customer service history reports.

- Working with marketing consultants Saxe Walsh, the company is supplying "value added" demographic marketing data base analyses comparing subscribers and nonsubscribers, giving profiles of premium pay service subscribers and analyzing cancelled service subscribers.

4. MCDONNELL DOUGLAS HEALTH SYSTEMS COMPANY (MDHSC)

a. Background

- This St. Louis (MO) company within McDonnell Douglas was formed as a component of the company's Information Systems Group. It is comprised of

five businesses providing processing and turnkey systems to the health care market.

b. DPS Offerings

- MDHSC's Hospital Financial Control (HFC) System connects terminals from the client's financial office to MDHSC's St. Louis computers to access accounting functions. Other hospital systems, including mini-based turnkeys, can link into the shared HFC processors.

- The DataComm system, introduced in the early 1980s, allows in-house processing and the concurrent operation of multiple modules such as distributed data entry, word processing, report generation, remote teleprocessing, admission forms printing, graphics, and custom programming. Larger, more complex applications are processed through the HFC system.

c. Strategies

- Through acquisitions and reorganization, MDHSC is positioning itself to be a leading provider in the health services market. The company's strategy emphasizes network capabilities and timesharing in support of turnkey systems (i.e., DPS).

- In 1984, approximately 75% of MDHSC's business was from timesharing and the balance from turnkey systems.

  - By 1990, the company forecasts the ratio will be reversed, with timesharing services serving as an integral part of the turnkey systems sold.

  - Thus, future growth will lie in DPS-type configurations.

- MDHSC is planning to provide systems that link physicians, health maintenance organizations, alternative care units, ambulatory units, and "emergicenters" into a feeder network for the hospital, and will provide systems to manage this network.

- MDHSC plans to integrate financial and patient care information with clinical information, providing a complete patient management system.

5. NATIONAL DATA CORPORATION (NDC)

a. Background

- This Atlanta (GA) based company provides specialized data processing, facilities management services, and professional services in bank cash management, credit card processing, information management, health care, and telemarketing processing and services.

b. DPS Offerings

- The Information Management Services division (created in 1982 with the acquisition of Rapidata, Inc.) has several micro-based processing services.

  - MicroService links customer micros with RCS mainframes for approximately 300 applications in decision support, small bank management, and messaging.

  - Banks may resell this system under their own name to corporate clients for monthly fees plus transaction charges.

- NDC's Health Care Services Division provides processing and turnkey systems for pharmacies.

- The DataStat Pharmacy Management System had used Data General minicomputers located at customer sites linked to NDC mainframes.

- In 1985, after observing high acceptance of NDC's IBM PC-AT- and XT-based turnkey pharmacy system, the on-line system was replaced with DataStat PC providing the same functionality as the earlier service.

- Price and new drug information can be received by the system which interfaces with electronic cash registers.

- Third-party claims can be prepared internally and sent through the network for processing. NDC's central processors collect these submissions, consolidate them by insurer, and deliver the information electronically to each insurer.

- Drug wholesalers can market this system to their customer base in independent, chain, hospital, and nursing home pharmacies.

- Data bases available from NDC are focused on financial and economic statistics, as well as ZIP code demographic information used in support of telemarketing/customer referral services.

c. <u>Strategies</u>

- By offering specialized micro-based systems and services for resale by others in their sphere of influences, NDC expands its marketing presence and allows banks and drug wholesalers to offer added value to their customers.

- NDC targets industries having synergistic processing characteristics, with each business unit pursuing its opportunities while sharing common corporate resources. For example:

- Retailers using NDC's credit card service may also require cash management and telemarketing services.

- Drug wholesalers selling micro-based systems can use NDC's telemarketing operations to sell systems.

- The company's marketing also includes direct sales, industry seminars, and convention participation. Active user groups provide close links with customers for timely market research feedback and, presumably, action on the findings.

- NDC has announced it may sell a portion of its information management processing services business or discontinue operations due to declining revenues. Users evaluating NDC's services should therefore get assurances of the longevity of the particular service being considered.

6. SHARED MEDICAL SYSTEMS CORPORATION

a. Background

- This Malvern (PA) company provides remote computing and distributed processing services plus turnkey systems and applications software to hospitals. It also provides facilities management to group medical practitioners and is a value-added reseller for IBM.

b. DPS Offerings

- The Hospital's Services Division provides DPS through an integrated product called ACTION which runs on DEC VAX or IBM MVS 4381 and higher processors installed at the hospital and connected to the SMS data center via leased lines or satellite links. The data center primarily supports financial management applications for hospitals.

- ACTION can be enhanced beyond this basic configuration with individual processors placed in ancillary hospital departments or in associated satellite hospitals and clinics.

- The processing functions are integrated, with most processing done on-site, while access to the SMS data center provides through connections to non-SMS computers operated by insurers, government agencies, and hospital suppliers.

- Thus, SMS places its system at the center of a network linking hospitals, Medicare organizations, insurers, government agencies, and hospital supply companies.

- These links support electronic data interchange applications to some 40 agencies and suppliers.

- Exhibit VII-2 shows an extended SMS network.

c. <u>Strategies</u>

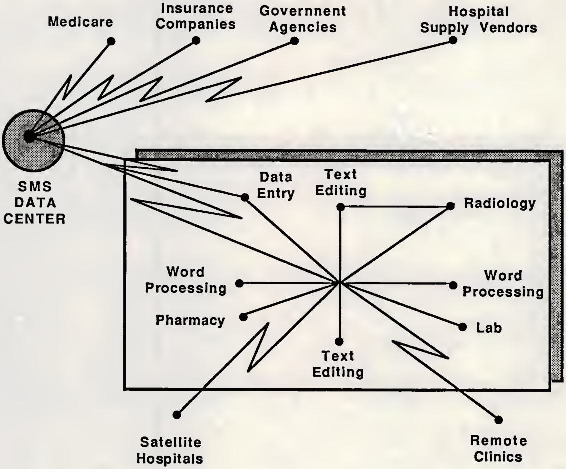
- SMS is the largest computer services vendor to the hospital industry, estimating approximately 60% of its total revenue is derived from remote processing, while one-third is from services and products associated with processing done on the client's premises.

- The company agressively pursues five-year contract renewals with group hospitals.

- The company has expanded the role of micros in its hosptial information networks with applications in nurse staffing and Medicare cost reporting. It has also introduced a local area network supporting IBM microcomputers.

EXHIBIT VII-2

SHARED MEDICAL EXTENDED DPS



- The company sees an active market for replacing outdated hospital financial systems. By targeting the center of a large, integrated network for its system, Shared Medical demonstrates the importance of data communications as a driving force in the hospital market.

- Unlike some firms which use DPS as an alternative delivery mode, SMS seems to be using the on-site products for competitive differentiation. It has added value to its offerings with EDI applications and data bases including the latest medical regulations, the Tumor registry, and comparative data between hospitals.

C. POTENTIAL DPS PROVIDERS AND OTHER CONFIGURATIONS OF INTEREST

1. COMSHARE INC.

- Comshare (Ann Arbor, MI) was founded in 1966 and is one of the earliest companies to offer commercial timesharing services.

- While processing services are still a major business, the company has enacted a new decision support strategy (DSS).

- Comshare continues to specialize in several RCS markets, including telecommunications, human resources administration, and data base management systems.

- Comshare offers System W, an integrated DSS mainframe and micro product. System W combines business reporting, modeling, forecasting, statistical analysis, spreadsheets, data management, graphics, communications, and interfaces for data acquisition from external software products.

- Comshare does not provide distributed processing services, although its System W software package can work on an integrated basis between micros and mainframes, including the vendor's remote computers.

2. COMPUTER SCIENCES CORPORATION

- CSC (El Segundo, CA) was one of the first remote computing service vendors and now provides a range of network and professional services in domestic, international, and governmental markets.

- CSC sources report examining DPS-type services when they were first introduced in the late 1970s; however, the company decided to place its focus elsewhere.

- The vendor's value-added network (INFONET) is oriented toward processing and network services for multinational corporations.

- CSC did introduce two InfoNet Professional Workstations based on IBM and Texas Instrument micros, designed for network use.

- In 1986 it made several software and service announcements:

  - An agreement with Simware for software to allow micros to access 327X host mainframes through Infonet.

  - A micro package called PC/Notice allowing ASCII or binary file transfers through the network's Notice electronic mail service.

  - An agreement with Orion Software for OrionNet service, permitting customers to link IBM 34, 36, and 38 minicomputers through Infonet.

3. DIGITAL EQUIPMENT CORPORATION (DEC)

- DEC's Enhanced Application Network Services, part of the company's Service Bureau, provides access to the DEC network, supporting services combining terminals or micros, customer host processors, and DEC host processors for an integrated distributed application delivered nationwide.

- The network provides customers with product information and allows hardware and software evaluation, peak load processing, and other incremental computer resources for special customer needs.

- Services are accessed locally and delivered remotely from the company's computer services centers. The company is headquartered in Maynard (MA).

4. WANG INFORMATION SERVICES CORPORATION (WISC)

- WISC was formed in June 1985 to leverage the company's technology and to create an additional revenue source.

  - Initially offering voice mail, electronic mail, shared tenant, and data base services, WISC will eventually operate as an RCS with accounting and scientific applications running on Wang and IBM systems. Access will be supported through Wang's proprietary and internal WangPac packet switching network.

  - While the plan is not finalized, it is expected that Wang will support DPS configurations with transparent links between departmental processors and RCS services.

  - Further, Wang will likely seek differentiation through support of compound document (voice/data/image) applications and will support OSI/ISO model standards.

- Exhibit VII-3 summarizes general business distributed processing services.

- The next chapter identifies prospective distributed processing service configurations and presents detailed recommendations to users considering DPS.

EXHIBIT VII-3

GENERAL BUSINESS DISTRIBUTED PROCESSING SERVICES

VENDOR	SERVICE	USER SITE HARDWARE	COMMENTS
ADP	Onsite	DEC IBM	First DPS Offering: 1978
CDC	Distributed Service	IBM Wang	IBM Service Introduced in 1983, Wang in 1985
Crowntek	Dedicated Processing	IBM	Blends with Facilities Mgt. Canada Only
GEISCO	Mark III DDP	Texas Instruments	Service No Longer Marketed

VIII RECOMMENDATIONS AND SUMMARY

VIII RECOMMENDATIONS AND SUMMARY

- This chapter presents potential applications beyond those currently being addressed by vendors which INPUT has identified for DPS-type services, and specific recommendations to users in approaching DPS service. It also describes user organization opportunities to develop DPS services for both internal use and for sale to others. Finally, the chapter offers some conclusions about the role of DPS in the new telecomputing environment.

A. A SHIFTING ORIENTATION

- While the focus of this report has been on minicomputer-based distributed processing services, INPUT observes that RCS vendors are taking a broader approach to incorporate other processors into the remote computing service mix--standalone or LAN-linked micros, multiuser systems, and corporate mainframes linked to RCS networks, data bases, applications, and computing power.

- This shift is represented in Exhibit VIII-1.

- Whereas distributed processing services have been based on vendor-supplied minicomputers, the intent is more closely aligned with cooperative processing.

    - In the micro-mainframe arena, we called this "shared functionality."

EXHIBIT VIII-1

A SHIFT IN ORIENTATION

DISTRIBUTED PROCESSING SERVICES

COOPERATIVE PROCESSING SERVICES

DISTRIBUTED PROCESSING SERVICES	COOPERATIVE PROCESSING SERVICES
Dedicated Mini	Micros/LANS, etc.
Vendor Supplied	User Supplied

- The terms essentially mean the same thing--processors working with other processors, regardless of configuration or who provides them.

B. FUTURE DPS IMPLEMENTATIONS

- This section describes potential DPS problem-solving implementations and provides examples of interest to INPUT clients.

- As will be discussed later in this chapter, IS organizations should not ignore the service orientation of their department in serving and anticipating user needs.

    - Accordingly, in some cases, the distributed processing requirements identified may be implemented without vendor involvement, while in others, third-party vendors are needed due to the nature of the application.

    - Users with unique needs are urged to work jointly with vendors to develop required customized applications. There may be opportunities to participate in any revenues which may result from the sale of these applications and services to others.

- This section may also be useful as a forecast of user requirements necessitating creative IS responses.

1. DISTRIBUTED DATA BASES (DDB)

- Certain organizations collect information at geographically distributed centers.

- For example, telemarketing operations can advertise one incoming phone number, taking calls in the East during much of the day, then shifting across the country to take advantage of a longer work day due to time zone differences.

- Telemarketing services and internal order taking departments are therefore generating a data base of new business, inquiries, adjustments, and customer service records which may require action from various branches of the company or client.

- A DPS configuration linking distributed data bases or maintaining a central data base (for improved response time) would support this type of activity.

2. VALUE-ADDED DATA BASES

a. Micro-Based Frontends

- OLDB's are providing the capability of aiding searches with micro-based software: research activity is conducted by the software working against indexes or a subset; appropriate remote data bases are selected; and natural language inquiries are converted into the commands understood by the service.

- Front-ending data bases with expert system software, a branch of artificial intelligence, is an emerging area. Applications may be found in:

  - Medical diagnostics.

  - Equipment maintenance and troubleshooting.

  - Telecommunications network planning.

- Large-scale project management.

- Demographic data base/market analysis.

b. Optical Disk Data Base Systems

- A marriage of CD ROM data bases and RCS/OLDB services or internal data bases is another potential application.

- The timeframe for optical disk-based bibiliographic data bases is unclear, but it is clear that such systems will eventually impact OLDB companies and RCS vendors providing data base access. INPUT foresees a time when well-known OLDB companies, such as Dialog, will publish and distribute CD ROM data bases under their own name, much as record companies issue music disks.

- CD ROMs will be primarily used locally by the user who thus avoids on-line and other charges.

  - For requirements beyond the time range or subject matter locally available, search software would access a remote, centralized data base or even decentralized repositories.

  - Updates, unlicensed (for distribution) information, and other information beyond that housed on the disk would thus be made available, generating revenue for the provider.

3. HEALTH CARE DPS IMPLEMENTATIONS

- The leading vendors of data processing services and turnkey systems for health care users are positioning themselves as full-line suppliers, with hardware, software, communications (internal/ external), and support.

- A hospital information system's ability to communicate will become more important in the future.

    - Care is being broken down by the severity of the illness, with the most severe cases going to primary care facilities, moderate cases to secondary and tertiary hospitals, and the least severe cases treated at home on an out-patient or alternative care basis.

    - Accordingly, networks linking these levels of care with ancillary services such as pharmacies, nursing care providers, and insurance carriers are needed.

- Information systems for occupational health specialists are needed, with data base information related to chemical and toxic substances and safety in the workplace. A specialized medical center could become a clearinghouse for this information, delivered through a remote computing service.

4. ELECTRONIC DATA INTERCHANGE DPS IMPLEMENTATIONS

- EDI is proving to be a major growth area.

- A DPS/turnkey system hosting business applications such as accounting, inventory, shipping control and/or cash management functions could be combined with RCS access for format translation and consolidation services.

- Such a configuration would likely appeal to small- and medium-sized companies and also to larger firms seeking to implement EDI in a timely manner but unable to provide central IS support (assuming an IS organization exists) due to geographical, workload, or other reasons.

5. SCIENTIFIC AND ENGINEERING DPS NEEDS

- Scientific and engineering applications often require large "number crunching" activities which would place significant demands on any internal processors; accordingly, using an outside service for these applications is attractive.

- By handling as much of the processing as possible internally, either on an RCS-supplied machine or one owned by the company, and then completing the action on the RCS mainframes, certain efficiencies are realized which suggests an opportunity to RCS vendors or large users specializing in these areas to provide, perhaps jointly, needed services.

6. GEOGRAPHICAL AND COMPANY SIZE DYNAMICS

- Companies of a certain size, and growing, are prime candidates for DPS. These companies often need information services but are unable to cope with the decision or management processes involved in implementing internal systems.

- Further, vendors of competitive approaches, such as minicomputers, may not be able to sell and support their equipment and software in remote locations, whereas an RCS or an enterprising user organization may be able to deliver greater capabilities through less complex, more easily maintained, user site hardware, assuming communications can be handled in a cost-effective manner.

C. USER RECOMMENDATIONS

- The recommendations in this section should be evaluated with regards to their appropriateness for the individual user organization.

I. EVALUATE FLEXIBILITY NEEDS

- One of the basic reasons for using RCS is flexibility. It is important for user organizations to evaluate both present and projected needs in this regard when considering a DPS configuration. Among the questions which need to be asked are:

  - Does the DPS configuration offer us an opportunity to buy what we need most and "rent" what will only be used occassionally?

  - Does the DPS offer us access to state-of-the-art technology in software, development tools, communications methods, and processing power or does it lock us into technologies which will soon become obsolete? In order to answer this question, IS needs to project any changing needs which may be difficult to adapt to if a commitment is made to a long-term DPS contract.

  - Does the service offers licenses for DPS applications which may be moved inside at a later date?

    - Occasionally, vendors will offer applications only through the RCS; in other words they are not available for licensing.

    - Depending on the type of application, conversions may be difficult.

  - Is the service bureau's hardware compatible with yours to facilitate bringing an application in-house or migrating a DPS over to existing machines?

- A DPS configuration will probably be only one of several methods used by the company to process its information.

- By distributing computing through a variety of approaches, the company is keeping its options open.

- An approach found suitable in one division may fit others. The experience can be shared for the maximum benefit, and the risks of taking one approach for the entire company minimized.

2. COST ANALYSIS

- Once the flexibility factors are evaluated, the next stage in evaluating DPS as an alternative is to carefully examine the costs associated with automating a currently manual system.

  - A detailed analysis should show capital expenses when compared to existing systems and amortized over five to seven years, leading to break-even within that period, if not sooner.

  - According to INPUT's research, operational costs for installed systems in most industry segments equals approximately 1% of corporate annual revenues after taxes.

  - Approximately 1.5% of the IS budget in all industries surveyed in 1985 was applied to external processing services; however, RCS expenditures may be charged to non-IS departments.

  - These averages vary among industries. Information intensive segments will naturally use more IS resources. Further, as the use of IS for competitive advantage accelerates, companies will be forced to increase their proportion of IS-related expenditures.

- Another cost factor relates to options in buying the dedicated user site hardware. Can you, for example, lease from the vendor, buy from the vendor, buy directly from the manufacturer, or buy used equipment for the best price?

3. PERSONNEL FACTORS

- Any analysis examining the trade-offs between developing or enhancing an internal IS department or continuing to use a remote computing service for at least some functions needs to examine costs and other factors such as:

  - Recruiting and retaining IS staff. If the company believes a shortage in IS professionals may prevent it from recruiting and keeping required employees to manage and operate an IS department, it should consider alternatives.

  - Supporting distributed departments. End-user departments are less knowledgeable about computing than IS. DPS software is designed to be function-specific, to dovetail with the end users' processes, jargon, and procedures. IS may not have the capability to evaluate third-party packages or to develop applications with this required specificity.

4. SERVICE REQUIREMENTS

- Keep in mind that RCS stands for remote computing service. Not only are computer resources available, but consulting, customized programming, data entry services, and other forms of valuable professional services are available and should be used to maximum benefit.

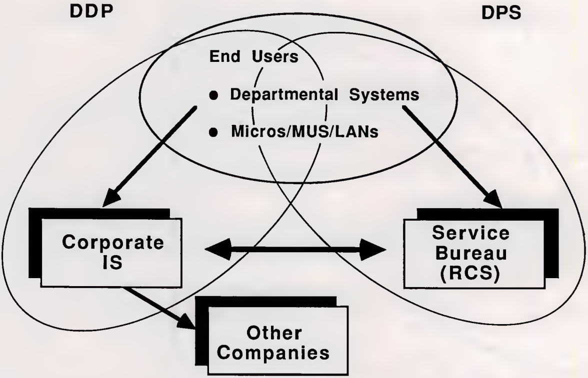
5. I.S. AS A DPS VENDOR

- Exhibit VIII-2 represents the departmental end-user relationships with both IS and external RCS vendors.

- End users will spend money with the lowest-cost best service provider, regardless of corporate affiliation. (IS typically charges end users for computer resources and services.)

EXHIBIT VIII-2

EXTERNAL VERSUS INTERNAL DISTRIBUTED PROCESSING



- In this way, IS becomes a competitive vendor. But note that IS may also be a service provider to other companies. INPUT's research has turned up several cases of IS departments seizing revenue opportunities by selling services. As recounted elsewhere, IS departments have historically been "spun-off" to form independent companies.

- The end user must evaluate all options available and choose configurations making the most sense in terms of the specific functions being addressed and the power, storage, services, and support required.

D. IN CONCLUSION

- A variety of processing solutions will continue to be found in the market at large and, in some cases, even within the same organization.

- Fitting the application and delivery mode to the specific need while considering the cost, operational, and strategic benefits is the real challenge.

- Traditional and emerging remote computing services will continue to provide vital services, and some firms may attempt to maintain the status quo. For others, however, long-term survival is dependent on their ability to adapt to technological change in profitably using the tools of the information age.

APPENDIX A: USER QUESTIONNAIRE

USER QUESTIONNAIRE

DISTRIBUTED PROCESSING SERVICES

My name is _______ and I'm calling from INPUT, a computer research firm in Mountain View, California. We're currently working on a report focusing on distributed processing services, that is, the use of a remote computing service which works with another processor dedicated to your use. We'd appreciate your thoughts on this, and in return for your help, we'll send you the executive summary of the report for your personal use. The interview should take about 15-20 minutes. Is now a good time?

Again, we're looking at distributed processing services which we define as the marriage of a remote computing service with an dedicated in-house processor, or one located at the RCS, but still dedicated to you. This dedicated processor may be your own machine, or the RCS'. It could even be a microcomputer, but not a terminal, nor a microcomputer which emulates a dumb terminal. Applications include data base access, inter-company information transfers, dedicated industry applications, etc. Do you have any questions about this definition?

Our first question is:

1. Are you aware of any distributed processing services from vendors? Y/N On a scale of 1-5, with 5 being very aware, how would you measure your awareness? 1 2 3 4 5.

2. Though what means are you aware of DPS?

_______advertising

_______articles

_______salesman

_______other

3.a. Is your company using ANY remote computing services at the present time? Y/N

b. [IF YES] What are the three main applications you are running on an RCS?

____

____

c. Could you estimate how much you are currently spending each month on RCS services? $___________/mo.

d. Has that increased or decreased in the past year?

e. By what percentage?_________(increase/decrease)

f. Why the change?

g. Do you expect your spending for RCS to increase or decrease over the next 12 months?

h. By what percentage?_________(increase/decrease)

i. If decrease, why?

j. What RCS Vendor(s) are you now using?____________

k. [IF NO CURRENT RCS] Did you ever use an RCS? Y/N

l. Who? ___________________

m. What applications DID you run on an RCS?

____

____

____

n. Could you describe why there was a change away from RCS services?

[IF NOW USING RCS]

o. One a scale of 1-5, with 5 being "highly likely", how likely would it be that you would CHANGE the company you now use for remote computing services? 1 2 3 4 5

p. And what would be some of the FACTORS involved in such a change?

q. Are you using a distributed processing service, where an computer dedicated to you works in conjunction with the RCS service? Y/N

r. What APPLICATIONS are you running in a DPS configuration?

____

____

____

s. What TYPE OF PROCESSORS are used in conjuction with the DPS service?

_______micros _______minis _______mainframes

_______on site _______located at RCS

_______own processor _______RCS provided processor

4. a. Do you know if there any OTHER DEPARTMENTS in your company which may be using either a Remote Computer Service or a Distributed Processing Service which do not go though IS? Y/N

b. [IF YES] Who might that be?______________________________________.

5.a. Could you tell me if there are ANY PLANS for using a DPS?

b. Why, or why not?

c. [IF YES] What APPLICATIONS being considered for DPS?

6. What ADVANTAGES do you see in a DPS service?

7. What DISADVANTAGES do you see?

8a. In order to get perspective on this topic, we'd like to know a little bit about your internal workings. Would you say you are centralized or decentralized with regards to your internal processing activities.

CENTRALIZED DECENTRALIZED

b. In order to help our analysis, we'd like to place a value on your current environment with regards to centralization. On a 1 to 5 scale, with five being all DEcentralized, would you say you are totally decentralized, totally centralized, or somewhere in between? (if in between, probe for a rating).

centralized			decentralized	
1	2	3	4	5

c. Now, in two years, do you think you would stay the same, or are you moving towards more decentralization? Where would you be, on our scale of 1-5 in two years?

centralized			decentralized	
1	2	3	4	5

d. How about in five years? Any estimate?

centralized			decentralized	
1	2	3	4	5

e. What are some of the reasons for these changes [or for remaining the same]?

f. [IF COMPANY IS NOW DECENTRALIZED BY ANY MEASURE, OR IS MOVING TOWARDS DECENTRALIZATIONS, ASK:] Could you tell me what manufacturers are represented or being considered as your Distributed Data Processing hardware vendor? (R) represented (C) considered

______DEC ______DG _______IBM ______PRIME

_______WANG _______ HP ______ ______

9. To what degree to you believe a distributed processing service provided by an RCS facilitates or satisfies your intent to distribute data processing internally?

10. Next, I'm going to read you a list of some applications tied to

the use of remote computing services, and ask if your company USES RCS SERVICES for these applications. I would also like to get a sense of the importance of these applications, now and in the future. We'll be using the 1-5 scale with 5 being very important.

So, the first question is, "is the application tied to a remote computing service" and then, could you give me your impressions of how important each is NOW, and how important do you think it will be in TWO YEARS.

[NOTE TO INTERVIEWER: For the two year rating, ask if it will be more important or less important, then ask for the rating in two years.]

	RCS	rank now	2 yrs
a. TIMESHARING a mainframe computer (TS)	| |	1 2 3 4 5	1 2 3 4 5
b. DATA BASE ACCESS (DB)			
c1.commercial data bases	| |	1 2 3 4 5	1 2 3 4 5
c2.your own data bases	| |	1 2 3 4 5	1 2 3 4 5
c. ELECTRONIC MAIL (EM) OVERALL	| |	1 2 3 4 5	1 2 3 4 5
Electronic Mail INternally	| |	1 2 3 4 5	1 2 3 4 5
Electronic Mail EXternally	| |	1 2 3 4 5	1 2 3 4 5
d. ORDER ENTRY/INQUIRY (OR)	| |	1 2 3 4 5	1 2 3 4 5
e. INVENTORY CONTROL (INV)	| |	1 2 3 4 5	1 2 3 4 5
f. Electronic Data Interchange [DEFINE IF NECESSARY: EDI is when you exchange electronic documents, such as purchase orders, with another company. It may require converting or translating to a standard format.] (EDI)	| |	1 2 3 4 5	1 2 3 4 5
g. HIGH LEVEL FINANCIAL ANALYSIS (FIN)	| |	1 2 3 4 5	1 2 3 4 5
h. DECISION SUPPORT SYSTEMS (DSS)	| |	1 2 3 4 5	1 2 3 4 5
i. LARGE SCALE PROJECT MANAGEMENT	| |	1 2 3 4 5	1 2 3 4 5

j. PERSONNEL APPLICATIONS (PER)			1 2 3 4 5	1 2 3 4 5
k. GRAPHICS (GR)			1 2 3 4 5	1 2 3 4 5
l. HIGH VOLUME TRANSACTIONS (order entry, payroll, etc.)			1 2 3 4 5	1 2 3 4 5
m. CONSOLIDATION such as cash management			1 2 3 4 5	1 2 3 4 5
n. ENGINEERING AND SCIENTIFIC			1 2 3 4 5	1 2 3 4 5
o. CAD/CAM APPLICATIONS			1 2 3 4 5	1 2 3 4 5

p. OTHER APPLICATIONS, particularly any unique to your industry:____

____

11. Do any of the applications you identified as using an RCS fit our definition of a distributed processing service, that is, running in conjuction with dedicated processors? Which?

12. Do you expect a remote computing vendor to provide you with help in INTEGRATING your EQUIPMENT with the service? Y/N

13. How about help in INTEGRATING your SOFTWARE with the service? Y/N

14. On a scale of 1-5, with regards to an RCS or DPS service, how would you rate your preference for a turnkey solution, with 5 being highly preferred? 1 2 3 4 5

15. If you were going to consider a DPS service, would prefer to buy it as a package, with all costs (communications, supplies, processing, maintenance) bundled together, or unbundled? Why?

Thank you for your help so far. I have just a few more questions.

16. I'm going to read you a short list of issues we think information services managers, like yourself, may be concerned about with regards to a remote computing service. Could you indicate how great a concern each is on a scale of 1-5, with 5 being "a great concern," and 1 being "little or no concern." The first is:

a. Security 1 2 3 4 5

b. Vendor's viability 1 2 3 4 5

c. Vendor's maintenance capability 1 2 3 4 5

e. Vendor's industry knowledge 1 2 3 4 5

f. Operating system environment 1 2 3 4 5

g. What operating system environments do you prefer to work in?

h. Same command structures as internal applications 1 2 3 4 5

i. Relevant applications 1 2 3 4 5

j. Communications technique 1 2 3 4 5

k. Network availability 1 2 3 4 5

l. IBM compatibility 1 2 3 4 5

Are there any other concerns you can identify?

m. ________________ 1 2 3 4 5

n. ________________ 1 2 3 4 5

17. a. On a scale of 1-5, with 5 being highly likely, how likely is it you would call on the services of an INDEPENDENT OUTSIDE DATA PROCESSING CONSULTANT to assist you in planning for your future processing needs? 1 2 3 4 5 b. WHY that rating?

18. a. And how likely is it that you would use the consulting services of a processing services VENDOR to assist you? 1 2 3 4 5 b. WHY that rating?

19. So you would rate your RELIANCE ON YOUR STAFF EXCLUSIVELY for planning at what level? 1 2 3 4 5.

20. Who typically would decide on whether or not you would use a DPS service? Would it be the end user department manager, IS, corporate management, or a combination? Could you describe the process?

21.a. Do you have any agreements in place where an outside vendor manages a portion of your data processing facilities? Y/N

b. [if yes] could you describe the reasons for this facilities management?

22. Can you imagine any circumstances in the future where you or one of your departments would require more computing power than you now have available when you might consider an RCS?

23. Do you think there would ever be a need for a supercomputer timesharing service where extremely powerful processors would be made available to you on a pay-as-you-go or bulk rate basis?

24. How about an RCS offering a DPS service using supercomputers?

25. Has your department or company developed any applications or software which is being offered, or might be offered to other companies as an RCS or DPS service? If yes, could you please describe?

26. Is there anything else you would like to see addressed in a report about remote computing services, in general, and distributed processing services in particular, directed to information systems managers, like youself?

That concludes our interview. I want to thank you for being so generous with your time. The executive summary of the report should be out in about 6-8 weeks. Once again, thank you.

APPENDIX B: VENDOR QUESTIONNAIRE

DISTRIBUTED PROCESSING SERVICES

VENDOR QUESTIONNAIRE

My name is ______calling from INPUT, in Mountain View Ca. We're a computer and communications research firm. We're currently working on a report examining distributed processing services which is the dedication of a processor to a customer which works with a remote computing service. I'd like to ask you a few questions about your company's involvement in this area. Is now a good time?

[By the way, we'll be sending you a summary of the report when we're done, sometime towards the end of August.]

1. According to our information, your company has the ________ service which fits this definition. Is this correct?

2. What TYPE OF PROCESSORS are dedicated to the user in this service?

3. Where typically are the dedicated processsors located:

_______customer's end user department

_______customer's central computer room

_______RCS facility

[if multiple, get percentage breakdown if possible-- also try to get # installationss here]

4. Are there ANY OTHER distributed processing services your company has, maybe in other divisions?

5. Could you describe briefly WHAT APPLICATIONS this service (s) is typically used for?

6. What SIZE COMPANY is TARGETTED for this service?

7. And WHAT INDUSTRIES?

8. Generally speaking, what industries or industry characteristics do you think benefit most from a DPS solution?

Any others?

9. What are the REASONS you think A COMPANY SHOULD USE this type of configuration rather than install an internal system?

10. Do you have any COSTING WORKSHEETS which are used by prospective clients to compare solutions to your DPS service? Since our study will be read by prospective users of DPS services, would it be possible to get a costing worksheet?

11. Do you do any CUSTOMER SATISFACTION surveys? Could you share with me some of the key benefits customers gain from the DPS?

12. How about things CUSTOMERS NEED, particularly those you are planning to address, or examples of problems which have been addressed recently?

13. It would be most helpful if I could talk with some of your DPS users, in order to develop a case study regarding how they came to the DPS decision. Could you REFER ME TO A REPRESENTATIVE USER?

14. What is the range of PRICING for your DPS? Monthly?

15. What is covered in the DPS agreement?

_______equipment leasing   ________expendable supplies

_______central processor timesharing? How much:________

_______central processor storage? How much:________

_______the network link to the central processor?

-------training   _______hotline _______software updates

______maintenance   _______other:_____________________________

____

16. How LONG A CONTRACT is generally required?

What happens if a client wants to break the contract?

17. Are there any provisions for applying or CREDITTING THE MONTHLY FEE towards equipment or software purchasing?

18. Is the SOFTWARE on the DPS AVAILABLE FOR CLIENT LICENSING for in-house installation?

19. With the costs of departmental processors coming down, how do you think distributed processing services can continue to hold, and add new, customers?

20. Could you describe how the dedicated system is LINKed to your RCS central processors? Is it leased line, through a VAN or a dial-up situation?

21. And what goes through that link?

_______software updates/patches ______data for complex processing

_______data for overload processing ______messages

______ remote equipment diagnostics

22. What TYPES OF DATA BASES are available to your clients?

23. Are these data bases PROPRIETARY to your company, or are they LICENCED from other companies?

24. Does the RCS also support any type of ELECTRONIC MAIL for DPS clients? Y/N Is it internal E-mail or external?

25. Does your processing support ELECTRONIC DATA INTERCHANGE, the transfer of electronic business documents such as purchase orders, between trading partners? Y/N

[If Yes] Could you describe this service?

26. Who would you consider your COMPETITORS in DPS services?

27. And what would you estimate YOUR MARKET SHARE to be?

28. Could you estimate the MARKET SHARE of your COMPETITORS?

29. HOW is your DPS BETTER than your competitors? In other words, what is your competitive advantage?

30. Can you tell me approximately HOW MANY CUSTOMERS you have for the DPS service? ______________

(probe for range if reluctant)

Is is fewer than 25? Fewer than 50? Fewer than 100? More than 150?

31. HOW do you DIFFERENTIATE your service from the others?

32. Could you describe your MARKETING STRATEGY with regards to DPS? Is it sold as a specific, unique service, or is it an alternative to other services and products you may offer? Why this approach?

33. Anything else about your marketing strategy?

34. We've heard it said that DPS can generate a very high OPERATING MARGIN. Is this true or false, in your opinion?

35. Could you indicate HOW MUCH of a profit margin we're talking about relative to revenue after taxes?

36. I would imagine that since there are competitors, or at least, competitive approaches to DPS, the profit margins may be feeling a little "squeezed." Do you think this is true?

37. Speaking more generally about Distributed Processing Services, and not your service in particular, do you think there is a need for GRAPHICS support in DPS? Y/N And with regards to your service, what, if any, types of graphics applications are provided?

38. Next I want to ask you what you think about the role of SUPERCOMPUTERS as an Remote Computing Service. Speaking generally about time sharing, could you talk a little about where, if anywhere, you see a need for access to so called "super computers?"

39. Could you talk a little about your company's approach to NEW TECHNOLOGIES. Would you say that typically, your company is

quick to adopt to new technologies in other words, on the "cutting edge" or do you hold back and take a rather conservative approach. I'd like to quantify this. On a scale of 1-5, with 5 being "leading edge" and 1 being "very conservative", where would you place your company with regards to technolgy.

1	2	3	4	5
very conservative				cutting edge

Why that rating?

Thank you for you help so far. I have just a few more questions.

40. As you are no doubt aware, RCS vendors have been hurt by minicomputers as well as microcomputers. In fact, some have dropped out of the processing business because of these machines while others have adapted. In a sense, DPS, where you, the vendor, provide the hardware, is partially a response.

a. Could you briefly discuss HOW YOUR COMPANY WORKS TO MAINTAIN ITS PROCESSING BUSINESS in the face of minis and micros? For example, are customer minis and micros used in support of remote computing services? If so, how?

b. How about customers mainframe computers? How are they included, if at all, in the remote computing business?

41. Thank you. Your comments have been quite helpful and I've enjoyed talking with you. For background information on your company, do you happen to have your 1985 revenues for the company as a whole handy?

42. Could you tell me how much of a percentage increase that has been over 1984?

43. And has your company any targetted revenue growth figures for 1986?

44. Finally, is there anything else you would like to contribute to our study on DPS, or any issues or questions you think should

be addressed?

Again, thank you for your help. We'll be sending you the executive summary of the report as soon as it is ready.

APPENDIX C: RELATED INPUT REPORTS

APPENDIX C: RELATED INPUT REPORTS

- Interested readers are referred to the following relevant studies:

  - Market Impacts of IBM Software Strategies presents a strategic view of IBM software directions through the turn of the century and establishes four strategic periods: The SNA/Distributed Processing period (to 1989), the Electronic Office period (1990-1995), the Expert Systems period (1996-2000), and the Custom Products period (beyond the year 2000).

  - Electronic Data Interchange. EDI is the electronic transfer of business documents between organizations in a structured application. This comprehensive report describes EDI activities in several industries, profiles EDI services and software vendors, analyzes issues affecting acceptance of EDI, and provides market forecasts and recommendations to industry participants.

  - Micro-Mainframe: End-User Experiences (1985) describes various M-M methods and their advantages and limitations, suggests implementation strategies, and projects changes in the technology and marketplace.

  - Micro-Mainframe: Corporate Impact describes the organizational and technological effects of M-M in the corporation in light of the growing demand of end-user access to corporate data bases. The impact of M-M products on the current inventory of standalone micro and mainframe software is also analyzed.

- Micro-Mainframe: Software Planning categorizes the M-M software products necessary to accommodate M-M access, with special attention on security and data integrity requirements. The report recommends a software development/acquisition strategy.

- Network Services Directions examines the issues, technologies, applications, and user factors impacting this highly complex market, with market forecasts, a comprehensive technology scan, and an analysis of the effects of mergers and acquisitions on both the market and end users. The study concludes with detailed recommendations for market participants--network vendors, hardware companies, and RCS vendors and users.

- IBM Operating Systems Directions examines impacts on plug compatible manufactuers, add-on equipment suppliers, systems and applications software developers, and professional service suppliers and users, providing guidance in improving future products, marketing, planning, and support strategies. Analysis of all major IBM operating systems, user needs, and the role of distributed processing is included, along with projections and forecasts.

- Departmental Software examines work group computing and the demand for software which incorporates new distributed processing power. The study analyzes the roles of hardware, software, and integrated office system vendors, vendor strategies, technology trends, user needs and issues, and presents detailed market forecasts and recommendations.

EXHIBIT II-1

INPUT®

REMOTE COMPUTING SERVICE HISTORY

1950s	-	Military Timesharing and Data Communications
1960s	-	Business Remote Computing
	-	Commercial Services Introduced
1970s	-	Minis, DDP, and Micros Appear
	-	Distributed Processing Services Introduced